Non-Diabetic Hyperglycaemia, 2018-19 Diabetes Prevention Programme

England

12 November 2020

Contents

This audit report is part of the National Diabetes Audit programme; for more information, please visit the NDA webpage at **https://digital.nhs.uk/NDA**.

Or for further information, please contact NHS Digital's Contact Centre on **0300 303 5678**, or email **enquiries@nhsdigital.nhs.uk**.

Non-Diabetic Hyperglycaemia:

1. Executive summary and recommendations

“What does this report show about people with non-diabetic hyperglycaemia and the Diabetes Prevention Programme?”

Executive Summary and Recommendations

There are currently almost 1.8 million people registered with GP practices in England who have been diagnosed with non-diabetic hyperglycaemia (NDH) – where the blood glucose level is high, but is not elevated into the diabetic range. These people have a high risk of developing Type 2 diabetes.

The NICE guideline PH38 ‘Type 2 diabetes: Prevention in people at high risk’ recommends regular monitoring and lifestyle intervention programmes for people at high risk of developing diabetes. The Diabetes Prevention Programme (DPP) has been introduced to provide interventions that aim to prevent or delay the onset of Type 2 diabetes in people with NDH.

This report examined the characteristics of people with NDH, the monitoring and interventions they have received, and the outcomes that followed.

Data has been collected alongside the National Diabetes Audit (NDA) for the period January 2018 to March 2019, for people registered at GP practices in England only. DPP providers have also supplied information on programme referrals up to March 2019 inclusive.

People with NDH are demographically similar to people who have been diagnosed with Type 2 diabetes – both groups are generally older, they more often come from areas of higher deprivation, and are more likely to be obese (30+ BMI) than the general England population.

Recording of referral offers to the Diabetes Prevention Programme are understood to be incomplete; however, fewer than one in four people with NDH are known to have been offered DPP, with considerable geographic variation in how many offers are recorded.

Executive Summary and Recommendations

Offers to the Diabetes Prevention Programme (DPP) are most likely to be made to people with a recent diagnosis of non-diabetic hyperglycaemia (NDH); DPP offers are also more likely to be made to people aged under 65, people of Asian or Black ethnicity, and people from more deprived areas.

The rate of blood glucose monitoring is high in people with a recent NDH diagnosis; 95 per cent of people diagnosed in the audit period had a blood glucose test in 2018-19. However, regular checks of BMI and blood glucose levels are NICE recommended for everyone at high risk of diabetes, and just 57 per cent of people with NDH had both checks undertaken recently.

One in twenty of the people included in the 2017-18 report on non-diabetic hyperglycaemia, had been diagnosed with diabetes when data was collected for the 2018-19 report.

The audit would therefore urge GP practices to follow these audit recommendations:

Recommendation 1 GP practices should continue to seek out and record diagnoses of non-diabetic hyperglycaemia where this is appropriate. [Chapter 3: Demographics]

Recommendation 2 GP practices should offer to assess the BMI of people with NDH as part of their regular monitoring of people who are at high risk of developing Type 2 diabetes. [Chapter 3: Demographics]

Recommendation 3 GP practices should endeavour to provide frequent checks (annual) of the blood sugar and BMI of people who have been diagnosed with non-diabetic hyperglycaemia. [Chapter 7: Care processes and treatment targets]

Non-Diabetic Hyperglycaemia:

2. Introduction

“What is non-diabetic hyperglycaemia, and how many people are affected by it?”

Introduction

The NHS Diabetes Prevention Programme (NHS DPP) is a joint commitment from NHS England, Public Health England and Diabetes UK to deliver, at scale, evidence based behavioural interventions that can prevent or delay the onset of Type 2 diabetes in adults who have been identified as having non-diabetic hyperglycaemia.

Non-Diabetic Hyperglycaemia

Non-diabetic hyperglycaemia (NDH) refers to blood glucose levels that are above normal but not in the diabetic range; HbA1c 42-<48 mmol/mol (6.0-<6.5%) or fasting plasma glucose (5.5-<7.0 mmol/l).

People with non-diabetic hyperglycaemia are at increased risk of developing Type 2 diabetes. They are also at increased risk of other cardiovascular conditions.

This report primarily uses data collected alongside the National Diabetes Audit (NDA) for the period January 2018 to March 2019 inclusive, and data generated by providers of the Diabetes Prevention Programme relating to referrals up to March 2019 inclusive.

This report is for England only. Unlike the NDA, it does not include information on Wales.

Which people appear in the report?

This report makes comparisons between the following groups[1] of people:

‘People with NDH’ People in this group have a GP record which contains a code indicating they have a recorded non-diabetic hyperglycaemia diagnosis, and does not contain any codes indicating a diagnosis of diabetes. [NDH]

‘People (with NDH) who have been offered DPP’ People in this group have a GP record which contains codes indicating that they have non-diabetic hyperglycaemia, and do not have a diagnosis of diabetes. Their GP record also shows that the person has been offered a place on a Diabetes Prevention Programme (DPP) course.

‘People with a DPP referral’ People in this group have a record from a DPP provider indicating that they were referred to the programme. At present these people have not been diagnosed with diabetes and may or may not have a non-diabetic hyperglycaemia diagnosis in their GP record. [DPP]

‘People with Type 2 diabetes’ People in this group have a GP record that contains a code indicating they have diabetes, but does not specify their diagnosis as Type 1 diabetes. [T2DM]

Recording of non-diabetic hyperglycaemia diagnoses and DPP offers is incomplete on GP systems. Information from DPP providers, therefore includes some people who have been referred to the DPP, but who have no NDH diagnosis and/or no DPP offer recorded by their GP.

Notes:

1. Analysis in this report that includes any of these groups will be highlighted as - 

How many people are diagnosed?

There are 3.0 million people in England with diagnosed Type 2 diabetes, and 1.8 million[3] with recorded non-diabetic hyperglycaemia.

Table 1: Registrations and prevalence[1,2], GP recorded Type 2 diabetes and non-diabetic hyperglycaemia, 2018-19, England

Registered at GP practice	Diagnosed with Type 2 diabetes (NDA 2018-19)		Diagnosed with non-diabetic hyperglycaemia	
	Number	Per cent	Number	Per cent
48,631,105	3,031,560	6.2%	1,776,210	3.7%

Source: NHS Digital

The National Cardiovascular Intelligence Network (NCVIN) estimates there are 4 million people with Type 2 diabetes and 5 million people with non-diabetic hyperglycaemia in England:
Estimates of CVD prevalence at www.gov.uk

Notes:
1. People included: aged 15 years and over (with a known, valid date of birth).
2. People included: registered at a GP practice that participated in NDA 2018-19.
3. Overall, 1,778,085 people were recorded with non-diabetic hyperglycaemia in NDH 2018-19. (Includes people with age unknown / under 15 years).

How many people are offered DPP?

Invitation to attend and uptake of offer

Referrals to NHS DPP courses are sometimes recorded in GP records, but the data is not complete.

Table 2: Offers for NHS DPP courses[1,2,3], GP recorded non-diabetic hyperglycaemia, 2018-19, England

DPP Offered	DPP Offered and not declined	DPP Offered but declined
381,860	241,255	140,605

Source: NHS Digital

Future plans

The audit plans to look further at data from Diabetes Prevention Programme providers and data extracted from GP systems in order to give a more detailed picture of the referral and attendance pathway.

Notes:
1. People included: All ages
2. People included: registered at a GP practice that participated in NDA 2018-19.
3. DPP offer included: All DPP courses offered at any time before April 2019.

How many people appear in this report?

There are 1,778,085 people with a GP record of non-diabetic hyperglycaemia.

381,860 of these people also have a GP record stating that they were offered a DPP place.

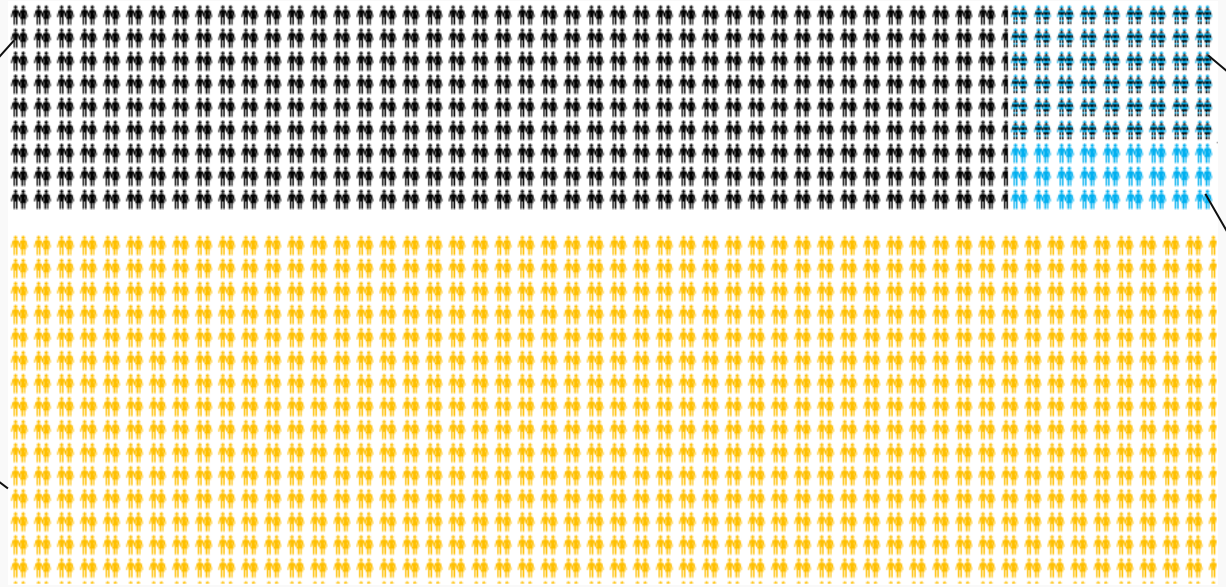
There are 326,565 people with a DPP provider record stating that they were referred to the programme.

There are 3,033,505 people with a GP record of Type 2 diabetes.

All values in this report are suppressed to reduce the risk of patient identification.

Values are rounded to the nearest five (and values 1-7 are set to 5).

Percentages are calculated using the rounded values.



People with only a GP record of NDH

People with a GP record of Type 2 diabetes

People with a GP record of NDH and a provider record of DPP

People with only a provider record of DPP

Non-Diabetic Hyperglycaemia:

3. Demographics

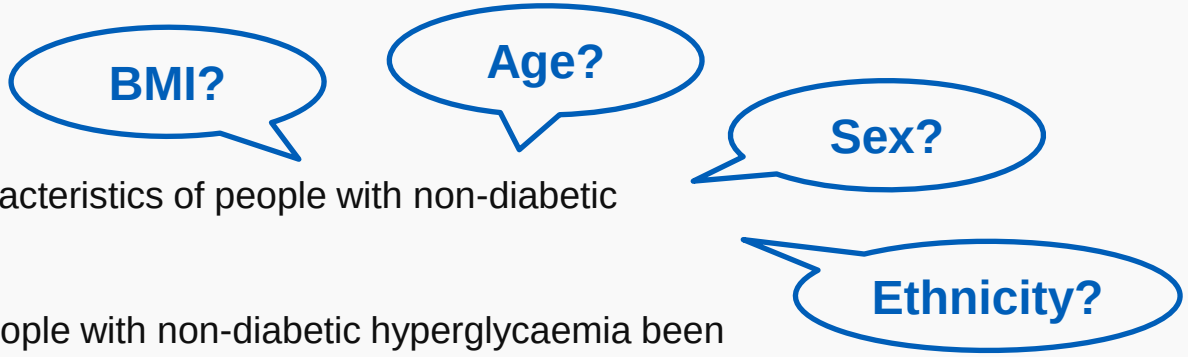
“What are the characteristics of people who have non-diabetic hyperglycaemia?”

Non-Diabetic Hyperglycaemia: Demographics

People with a blood glucose level that is above normal, but not high enough to indicate diabetes (fasting blood glucose, 5.5-<7.0 mmol/l; HbA1c, 42-<48 mmol/mol) are defined as having non-diabetic hyperglycaemia (NDH).

What are the characteristics of people with non-diabetic hyperglycaemia?

How long have people with non-diabetic hyperglycaemia been diagnosed?



Results and Recommendations

- Almost half of people with non-diabetic hyperglycaemia are recorded with diagnoses from 2017 onwards.

The increasing numbers of recorded diagnoses is an encouraging sign of improvement. The difference between estimated and recorded NDH figures indicates that many more people remain to be identified.

Recommendation 1 GP practices should continue to seek out and record diagnoses of non-diabetic hyperglycaemia where this is appropriate

- More than 2 in 5 people with non-diabetic hyperglycaemia do not have a recent BMI recorded.

Recommendation 2 GP practices should offer to assess the BMI of people with NDH as part of their regular monitoring of people who are at high risk of developing Type 2 diabetes.

NDH Demographics: Age & Ethnicity

Table 3: Registrations[1,2], by age, GP recorded non-diabetic hyperglycaemia, 2018-19, England

Registrations	Age	Under 40	40 – 64	65 – 79	80+	Unknown
	Number	98,945	749,690	669,285	258,290	1,870
	Per cent	5.6	42.2	37.6	14.5	0.1

Source: NHS Digital

Table 4: Registrations[1,2], by ethnicity, GP recorded non-diabetic hyperglycaemia, 2018-19, England

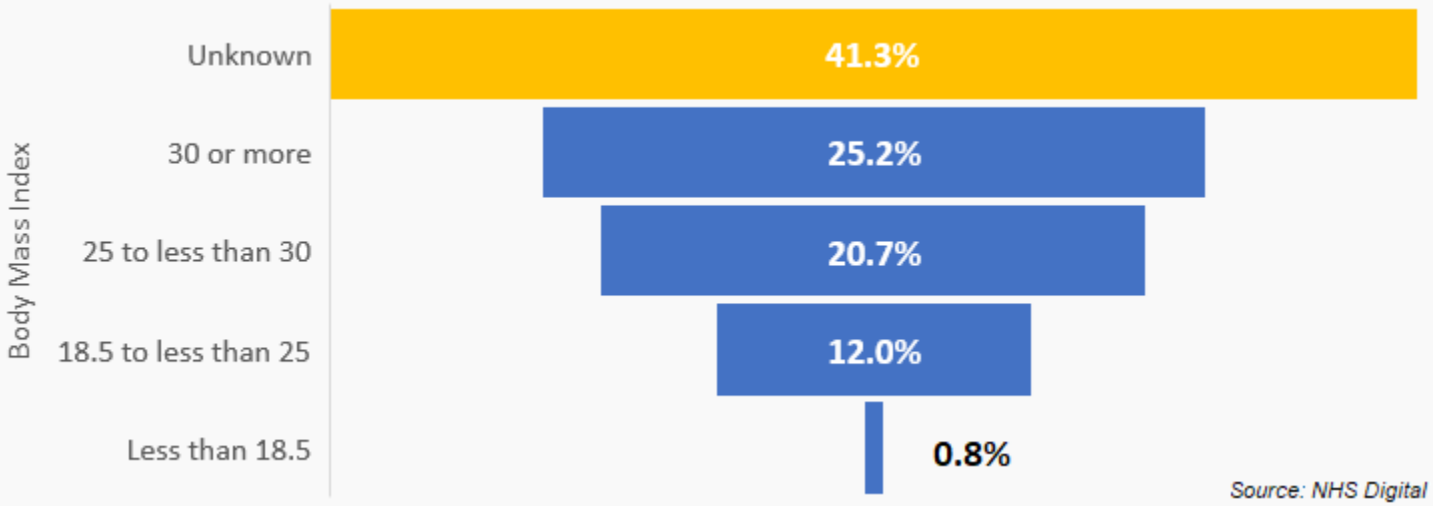
Registrations	Ethnicity	White	Asian	Black	Mixed	Other	Not stated or unknown
	Number	1,189,655	190,465	76,555	17,715	16,855	286,845
	Percent	66.9	10.7	4.3	1.0	0.9	16.1

Source: NHS Digital

Notes:
1. People included: All ages
2. People included: registered at a GP practice that participated in NDA 2018-19.

NDH Demographics: BMI

Figure 1: Registrations[1,2], by Body Mass Index (BMI), GP recorded non-diabetic hyperglycaemia, 2018-19, England



More than two-fifths of people with NDH do not have a recent BMI value recorded.

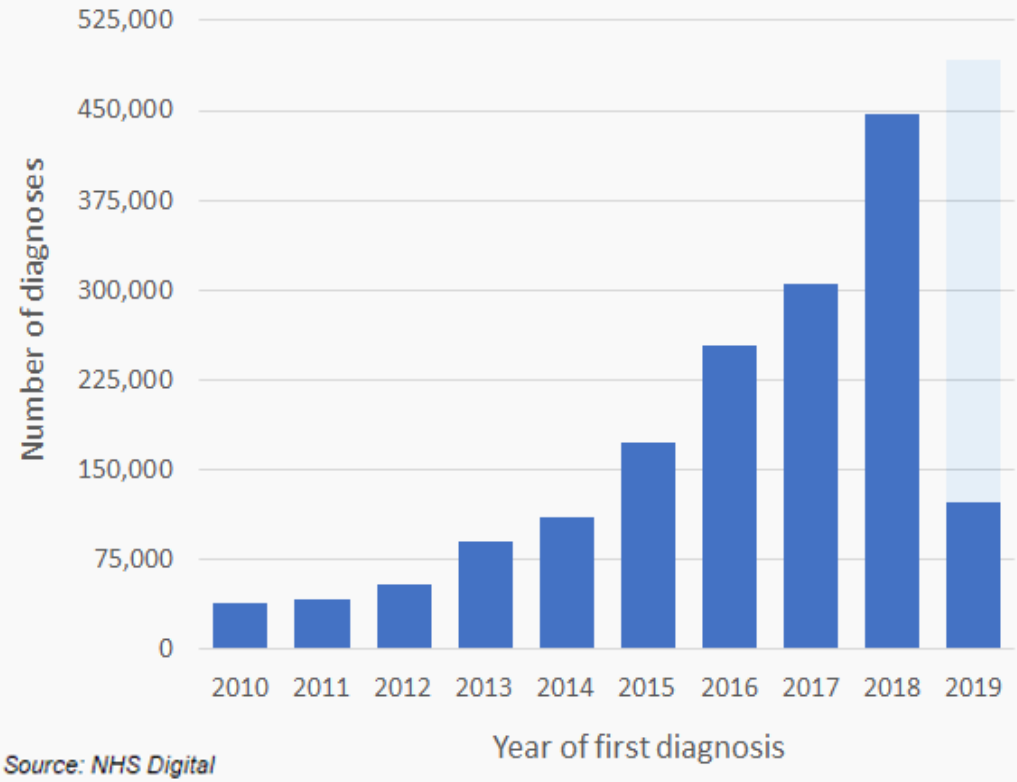
NICE: Public health guideline[3] [PH38]

1.6.5 For people at high risk (a high risk score and fasting plasma glucose of 5.5–6.9 mmol/l, or HbA1c of 42–47 mmol/mol [6.0–6.4%]), offer a blood test at least once a year (preferably using the same type of test). ***Also offer to assess their weight or BMI***…. [2012]

Notes:
1. People included: All ages
2. People included: registered at a GP practice that participated in NDA 2018-19.
3. NICE: Type 2 diabetes: prevention in people at high risk (PH38), 2017. Recommendation: 1.6.5

NDH Demographics: Year of diagnosis

Figure 2/Table 5: Registrations[1,2], by year of first diagnosis[3,4], GP recorded non-diabetic hyperglycaemia, 2018-19, England



Source: NHS Digital

Notes:

1. People included: All ages, with a first diagnosis of NDH in 2010-19.
2. People included: registered at a GP practice that participated in NDA 2018-19.
3. People may have multiple dates of diagnosis recorded.
4. Diagnoses up to Mar 2019 only. Estimated diagnoses for Apr-Dec 2019 shown (shaded) in Figure 2.

Year of first diagnosis	Number	Per cent
2010	38,170	2.3
2011	41,490	2.5
2012	54,850	3.3
2013	90,595	5.5
2014	110,305	6.7
2015	172,440	10.5
2016	253,915	15.5
2017	305,440	18.7
2018	447,575	27.3
2019	122,905	7.5

Source: NHS Digital

People may have experienced elevated levels of blood glucose for some time before they received their first non-diabetic hyperglycaemia diagnosis.

NDH Demographics: Sex & Deprivation

Figure 3: Registrations[1,2], by sex, GP recorded non-diabetic hyperglycaemia, 2018-19, England

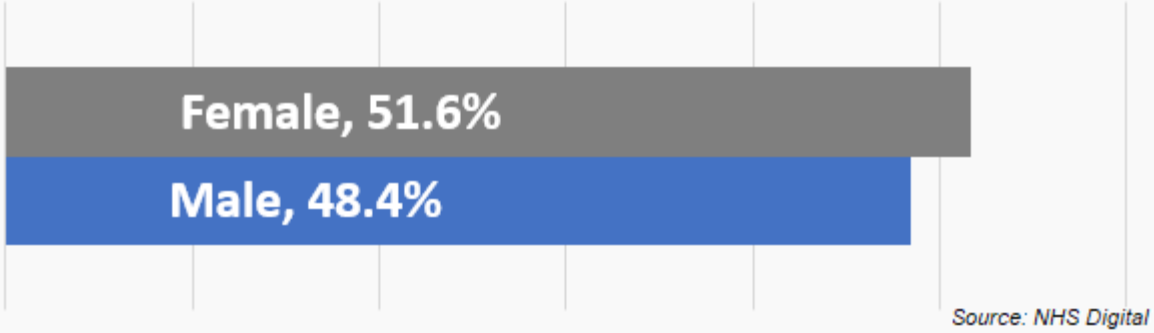


Table 6: Registrations[1,2], by deprivation quintile, GP recorded non-diabetic hyperglycaemia, 2018-19, England

Registrations	Deprivation quintile (IMD)	Most Deprived	2nd Most Deprived	3rd Most Deprived	2nd Least Deprived	Least Deprived	Unknown
	Number	378,310	365,970	359,055	343,605	330,035	1,110
	Percent	21.3	20.6	20.2	19.3	18.6	0.1

Source: NHS Digital

Notes:

1. People included: All ages
2. People included: registered at a GP practice that participated in NDA 2018-19.
3. People with IMD Unknown includes people resident in Wales, Scotland, etc. as well as people without a valid postcode recorded.

Non-Diabetic Hyperglycaemia:

4. Comparative demographics

“How alike are people with NDH, people with DPP referrals, people with Type 2 diabetes, and people in the general population?”

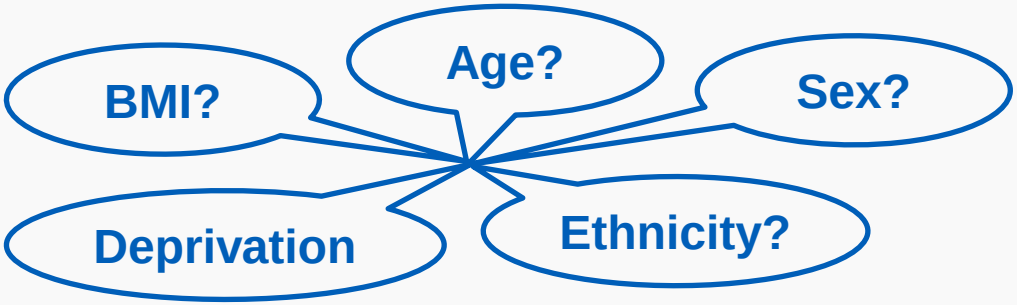
Comparing demographics

People with non-diabetic hyperglycaemia and people with diabetes share the common characteristic of elevated blood glucose levels (in comparison to people in the general population who do not have these conditions).

- What other similarities are there between people with NDH and people with diabetes?

People are referred to the Diabetes Prevention Programme to reduce the likelihood that their non-diabetic hyperglycaemia develops into diabetes. They would be expected to share similar characteristics to people with GP recorded non-diabetic hyperglycaemia, and to people with diabetes.

- Are people with DPP referrals similar to people with NDH and/or people with diabetes?



Results

- People with type 2 diabetes are more likely to be from a more deprived area than people with GP recorded NDH.
- There is little difference in age between people with type 2 diabetes and those with NDH amongst people who are white, while amongst other ethnicities, people with NDH tend to be younger than people with type 2 diabetes.
- People with DPP have similar distributions of BMI to people with GP recorded NDH across ethnicity groups, while people with Type 2 diabetes are slightly more likely to be obese than those with NDH or DPP referrals.

Caution! Information from the Diabetes Prevention Programme does not include complete demographic information, so these people are not included in all measures in this section.

NDH / Type 2 diabetes: Age and Sex

Figure 4: Age distribution[1,2], by sex, GP recorded non-diabetic hyperglycaemia (NDH) / Type 2 diabetes[3] (T2DM), and England[4] (ONS mid-2018 estimates), 2018-19, England

Notes:

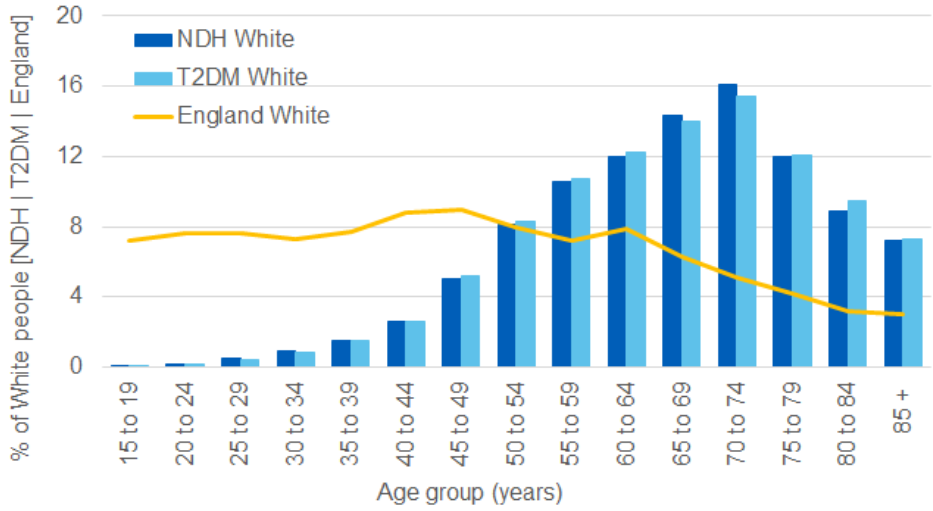
1. People included: those who are aged 15 years and over (with a known, valid date of birth).
2. People included (NDH, T2DM): registered at a GP practice that participated in NDA 2018-19.
3. People included (T2DM): those in NDA 2018-19 who did not have type 1 diabetes.
4. Data for the estimated general England population was taken from ONS 'Estimates of the population for the UK, England and Wales, Scotland and Northern Ireland' for mid-2018.

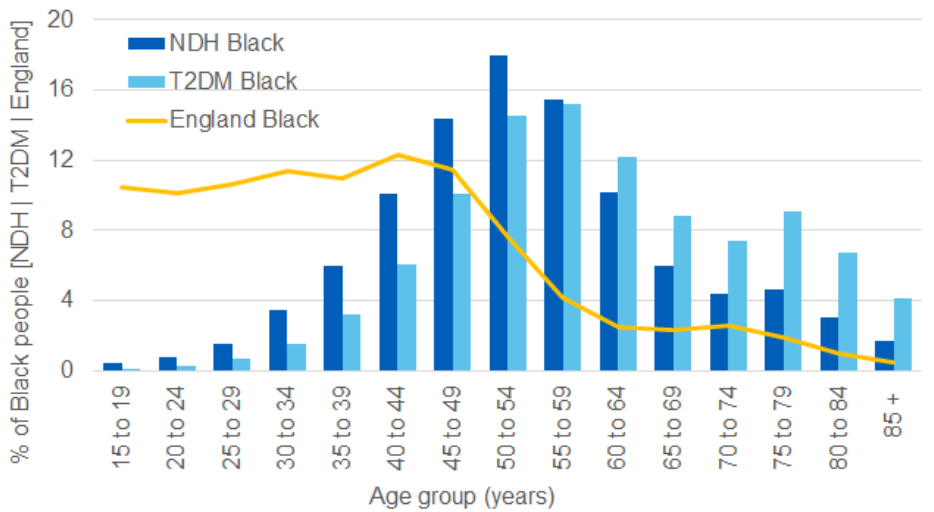
The non-diabetic hyperglycaemia population, and the Type 2 diabetes population are similar to each another, in that both groups are markedly older than the general England population.

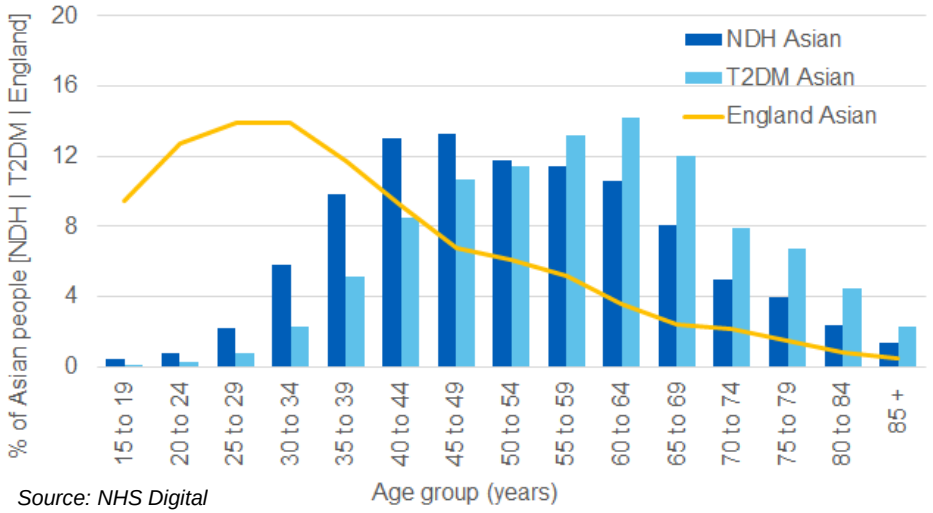
However, there were proportionally more people aged under 40 years in the non-diabetic hyperglycaemia population than in the population of people with Type 2 diabetes.

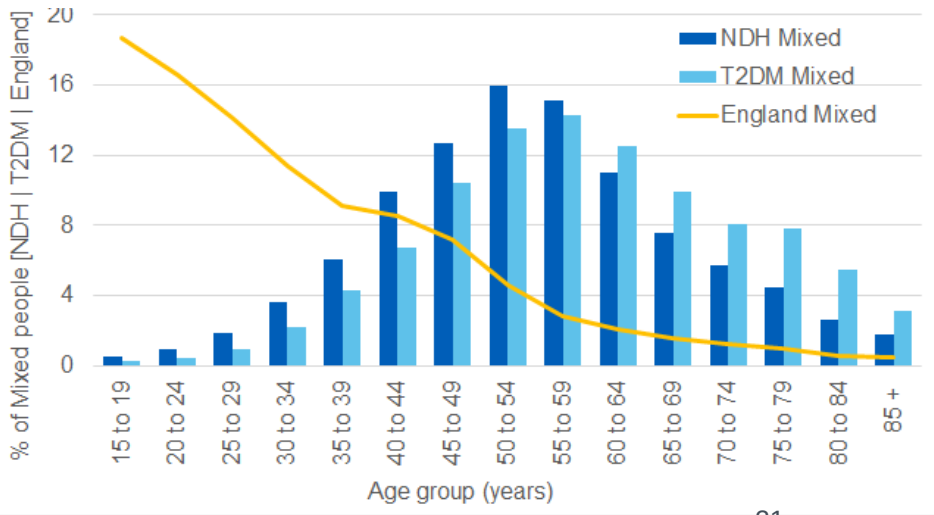
NDH / Type 2 diabetes: Age and Ethnicity

Figure 5: Age distribution[1,2], by ethnicity, GP recorded non-diabetic hyperglycaemia (NDH) / Type 2 diabetes[3] (T2DM), and England[4] (Census 2011), 2018-19, England







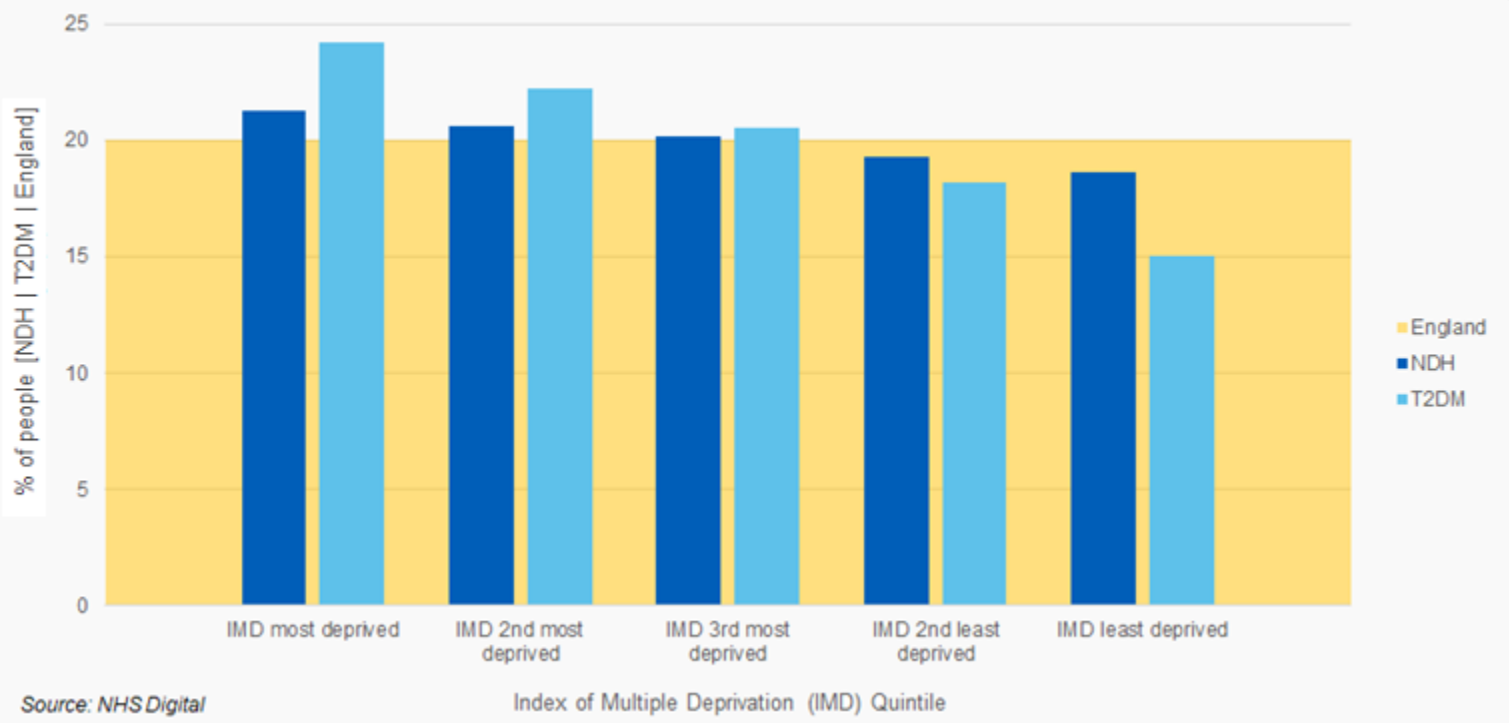


Source: NHS Digital

Notes: 1. People included: those who are aged 15 years and over (with a known, valid date of birth). 2. People included (NDH, T2DM): registered at a GP practice that participated in NDA 2018-19. 3. People included (T2DM): those in NDA 2018-19 who did not have type 1 diabetes. 4. Data taken for the usual resident population of England (27 March 2011): 2011 Census.

NDH / Type 2 diabetes: Deprivation

Figure 6: Deprivation breakdown[1,2] (quintiles), GP recorded non-diabetic hyperglycaemia (NDH) / Type 2 diabetes[3] (T2DM) and England, 2018-19, England

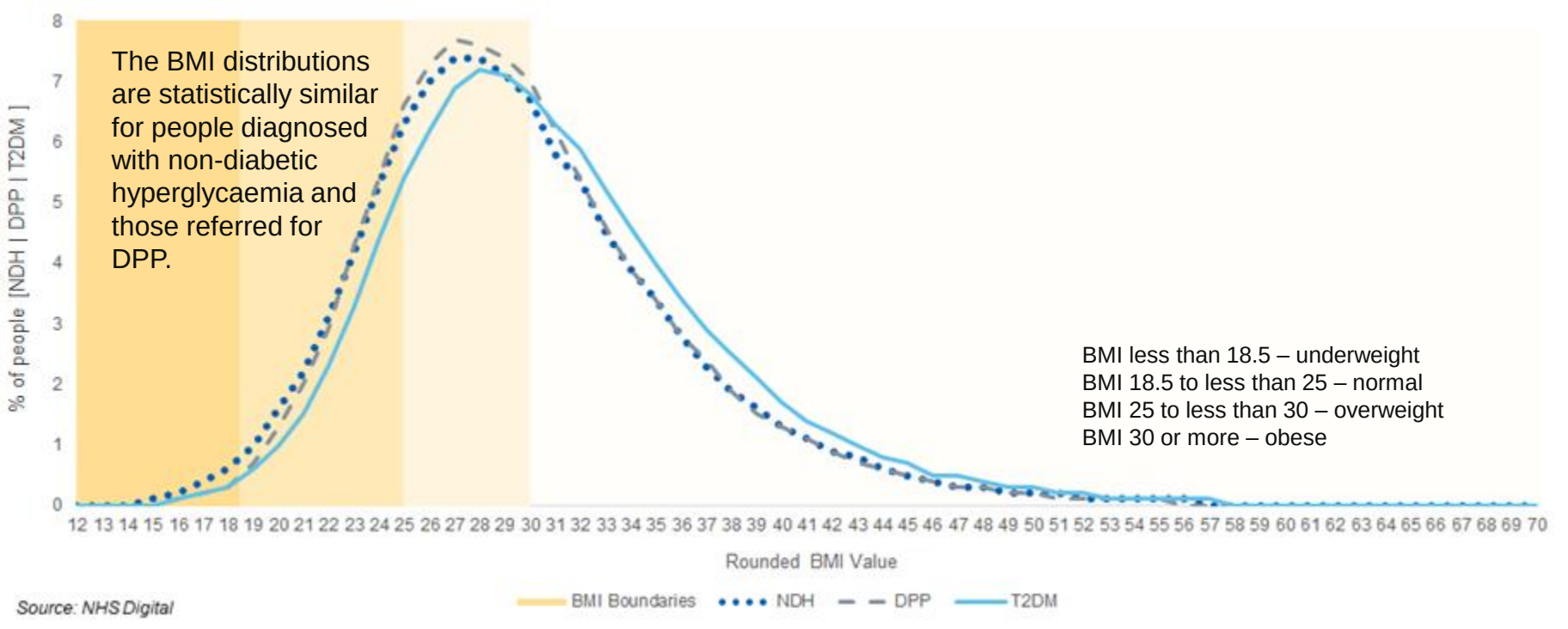


Notes:
1. People included: All ages
2. People included (NDH, T2DM): registered at a GP practice that participated in NDA 2018-19; with a known LSOA recorded (England).
3. People included (T2DM): those in NDA 2018-19 who did not have type 1 diabetes.

People with non-diabetic hyperglycaemia (NDH) are slightly more likely to live in areas of high deprivation than the general population, while people with Type 2 diabetes are more likely to live in areas of high deprivation than people with NDH.

NDH / DPP / Type 2 diabetes: BMI

Figure 7: Body Mass Index[1,2] (BMI), GP recorded non-diabetic hyperglycaemia (NDH) / Type 2 diabetes[3] (T2DM), Diabetes Prevention Programme[4] (DPP), 2018-19, England



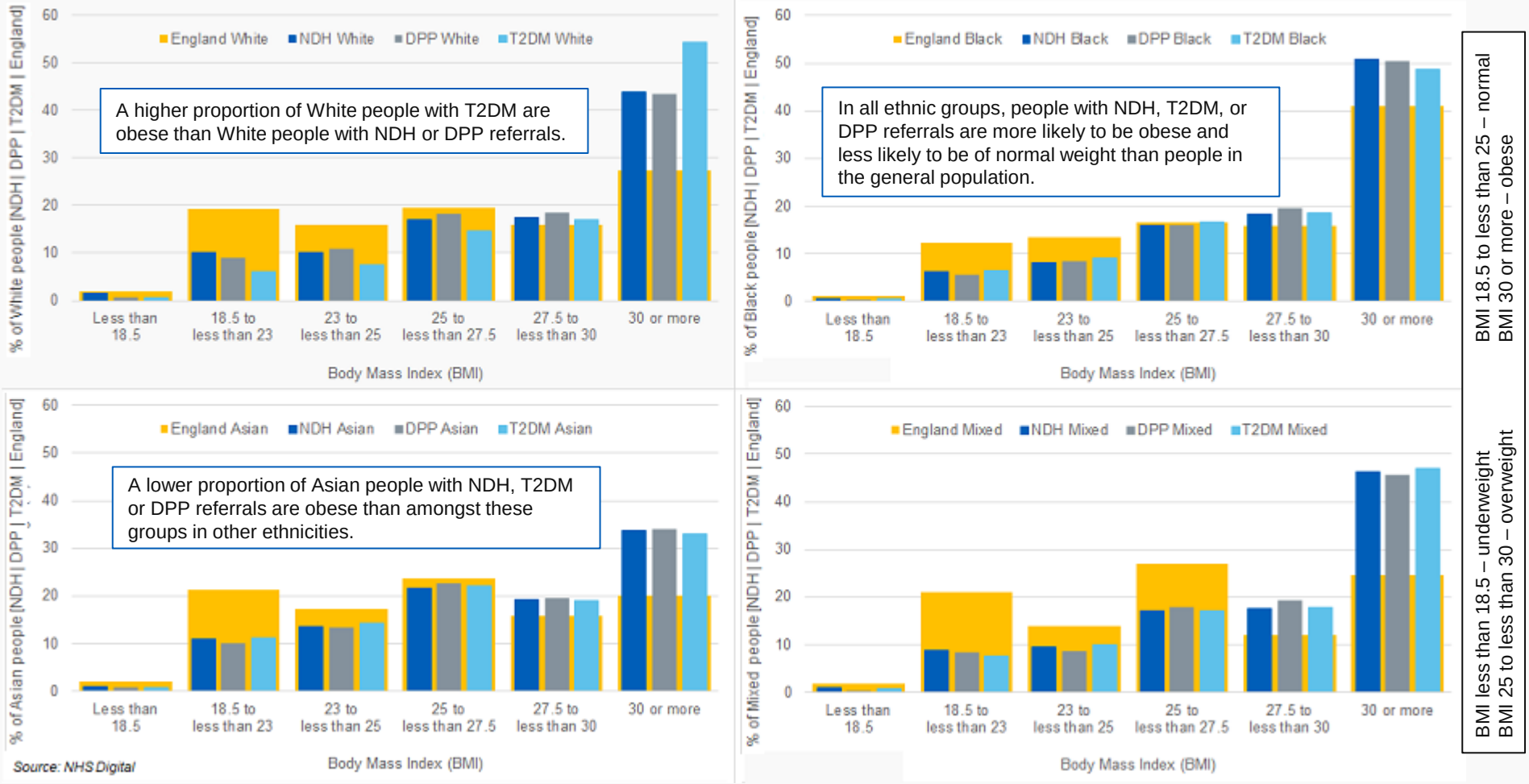
People with Type 2 diabetes are more likely to have an obese BMI, than people diagnosed with non-diabetic hyperglycaemia and those referred for DPP. People with DPP referrals and people with NDH are more likely to have a BMI indicating they are overweight or of normal weight than people with Type 2 diabetes.

Notes:

1. People included: All ages
2. People included (NDH, DPP, T2DM): registered at a GP practice that participated in NDA 2018-19; with a known BMI recorded
3. People included (T2DM): those in NDA 2018-19 who did not have type 1 diabetes.
4. People included (DPP) those with a provider record of a DPP referral who do not have a data opt-out.

NDH / DPP / Type 2 diabetes: BMI and Ethnicity

Figure 8: Body Mass Index[1,2] (BMI), by ethnicity, GP recorded non-diabetic hyperglycaemia (NDH) / Type 2 diabetes[3] (T2DM), Diabetes Prevention Programme[4] (DPP), and England[5] (Health Survey for England 2015-17), 2018-19, England



Notes: 1.People included (NDH, DPP, T2DM): All ages. 2. People included (NDH, DPP, T2DM): registered at a GP practice that participated in NDA 2018-19. 3. People included (T2DM): those in NDA 2018-19 who did not have type 1 diabetes. 4. People included (DPP) those with a provider record of a DPP referral, who do not have a data opt-out. 5. Data from Health Survey for England: 2015-17 Aged 16+ only.

Non-Diabetic Hyperglycaemia:

5. Diabetes Prevention Programme

“How many people in the Diabetes Prevention Programme are diagnosed with NDH?”

Diabetes Prevention Programme

The Diabetes Prevention Programme offers people - who are at high risk of developing diabetes - interventions through behavioural change programmes to reduce their risk of diabetes.

> "The NDPP [NHS Diabetes Prevention Programme] is a joint initiative between NHS England, Public Health England and Diabetes UK. It aims to deliver services at a large scale, for people already identified with non-diabetic hyperglycaemia who are therefore at high risk of developing Type 2 diabetes. High risk individuals will be offered a behavioural intervention to enable them to reduce their risk of developing Type 2 diabetes through weight loss, as a result of improved diet and increased levels of physical activity."
>
> **NHS England[1]**

The information recorded about the Diabetes Prevention Programme in GP clinical systems is limited and incomplete. Providers of the DPP independently record demographic information about the people who have been referred to them, and – where people choose to participate in the programme – details about how they have interacted with the service.

People are identified as having non-diabetic hyperglycaemia in this report based on diagnoses that may have been recorded on their GP record, such as pre-diabetes or impaired glucose tolerance, as well as non-diabetic hyperglycaemia. Not every person who has been identified as high risk, and who might be offered a DPP place, may have these diagnoses recorded[2].

How many people referred onto the Diabetes Prevention Programme have their non-diabetic hyperglycaemia diagnosis recorded at their GP practice?

Notes:

1. NHS England: 2019 NHS Diabetes Prevention Programme National Service Specification
2. NHS Digital: Diabetes Prevention Programme Pilot Study, 2017. found that 73.5% of high risk patients in the pilot GP practices were not recorded with a diagnosis.

DPP referrals by NDH diagnosis

From data supplied by DPP providers, 326,565 people[1,2] were referred to the NHS Diabetes Prevention Programme before April 2019. Although numbers taken from GP record data are similar - 381,860 people were offered a DPP place in same time period - this does not necessarily mean that the same people are recorded in both sources.

Table 7: People with a DPP referral[1,2], by GP recording of non-diabetic hyperglycaemia, 2018-19, England

Diagnosis in GP record	Number	Per cent
Total	326,565	
- NDH diagnosis present	213,730	65.4
- NDH diagnosis not present	112,835	34.6

Source: NHS Digital

More than one third of the people who DPP providers reported had been referred to one of their courses, had no non-diabetic hyperglycaemia recorded in their GP record.

In large[3] CCGs, between 13.1 per cent and 95.5 per cent of people who have been referred on to the DPP also have a GP recorded diagnosis of NDH; showing the wide variation in recording practice across England.

Notes:

1. People included: All ages, with a known valid NHS number; registered at a GP practice that participated in NDA 2018-19, without a current (NDA 2018-19) diagnosis of diabetes; with a referral to the DPP programme as recorded by one of the DPP providers.
2. People excluded: All those who have chosen to opt out of allowing their information to be used by other organisations, including NHS Digital.
3. CCGs included: with at least 1,000 people referred to the Diabetes Prevention Programme.

Non-Diabetic Hyperglycaemia:

6. Accessing the Diabetes Prevention Programme

“Are places on the Diabetes Prevention Programme offered uniformly, or is there variation in how places are offered to people with NDH?”

Diabetes Prevention Programme Offers

People are eligible[1] for referral to the NHS Diabetes Prevention Programme when they have had a blood test within the last 12 months, and the reading was 42 – 47 mmol/mol (HbA1c) or 5.5 – 6.9 mmol/l, fasting plasma glucose (FPG).

1.8 million people in England have been diagnosed with non-diabetic hyperglycaemia, and have had this diagnosis entered in their GP record. Records from primary care document that 381,860 (21 per cent) of these people have been offered a place on a DPP course.

Which people with NDH are being offered DPP places?

Is there variation in how places are offered?

GP data on offers of DPP places to people with NDH are incomplete.

Information on programme referrals is also recorded by the providers of the Diabetes Prevention Programme, but the data from DPP providers is not examined here.

NICE guidelines[2]: People that have been identified as being at high risk of developing diabetes and have either fasting plasma glucose (FPG) of 5.5-<7.0 mmol/l or HbA1c of 42-<48 mmol/mol, should be offered a referral to a 'local, evidence-based, quality-assured intensive lifestyle change programme'.
People with an FPG of 6.5-<7.0 mmol/l or HbA1c of 44-<48 mmol/mol should be prioritised where places are limited. Referrals should also be offered to people with fasting plasma glucose of 7.0+ mmol/l or HbA1c of 48+ mmol/mol who are not confirmed with type 2 diabetes, and may be offered to people with a high diabetes risk who have not had their FPG or HbA1c tested.

Notes:

1: NHS England: Eligibility Changes relating to the NHS Diabetes Prevention Programme: Revised Guidance, 2017.
2: NICE: Type 2 diabetes: prevention in people at high risk (PH38), 2017. Recommendations: 1.5.4-5, 1.5.7-8

DPP Offers: Sex, Age

Table 8: Sex, by DPP offer status, GP recorded non-diabetic hyperglycaemia (NDH), 2018-19, England

Diagnosis in GP record: NDH	Male		Female		Other / Unknown	
	Number	Per cent	Number	Per cent	Number	Per cent
Offered DPP	181,235	47.5	200,630	52.5	5	0.0
Not offered DPP	679,935	48.7	716,285	51.3	5	0.0

Source: NHS Digital

Table 9: Age group, by DPP offer status, GP recorded non-diabetic hyperglycaemia (NDH), 2018-19, England

Diagnosis in GP record: NDH	Under 40		40 - 64		65 - 79	
	Number	Per cent	Number	Per cent	Number	Per cent
Offered DPP	23,620	6.2	175,690	46.0	141,230	37.0
Not offered DPP	75,330	5.4	574,000	41.1	528,055	37.8

	80 +		Unknown	
	Number	Per cent	Number	Per cent
	41,250	10.8	75	0.0
	217,040	15.5	1,800	0.1

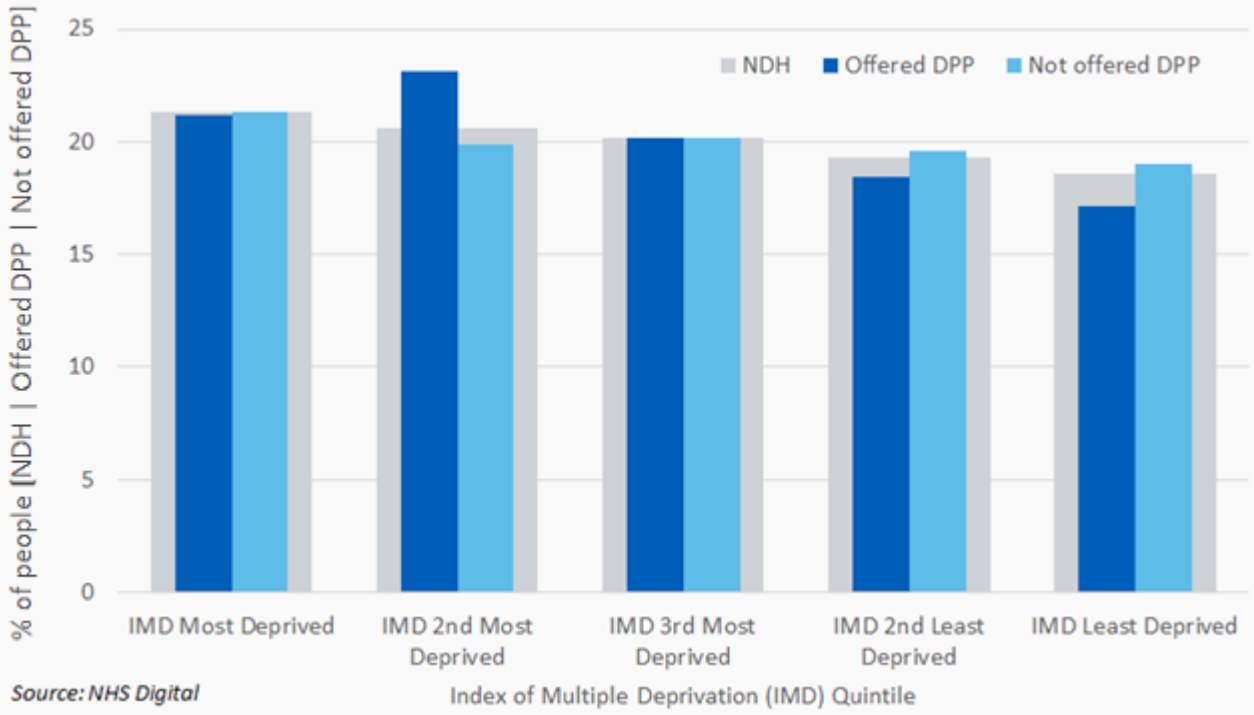
Source: NHS Digital

People with NDH who are offered DPP are **more likely** to be aged under 65 than those who are not offered DPP.

Notes:
1. People included: All ages
2. People included: registered at a GP practice that participated in NDA 2018-19.

DPP Offers: Deprivation

Figure 9: Deprivation (quintiles), by DPP offer status, GP recorded non-diabetic hyperglycaemia (NDH), 2018-19, England



Source: NHS Digital

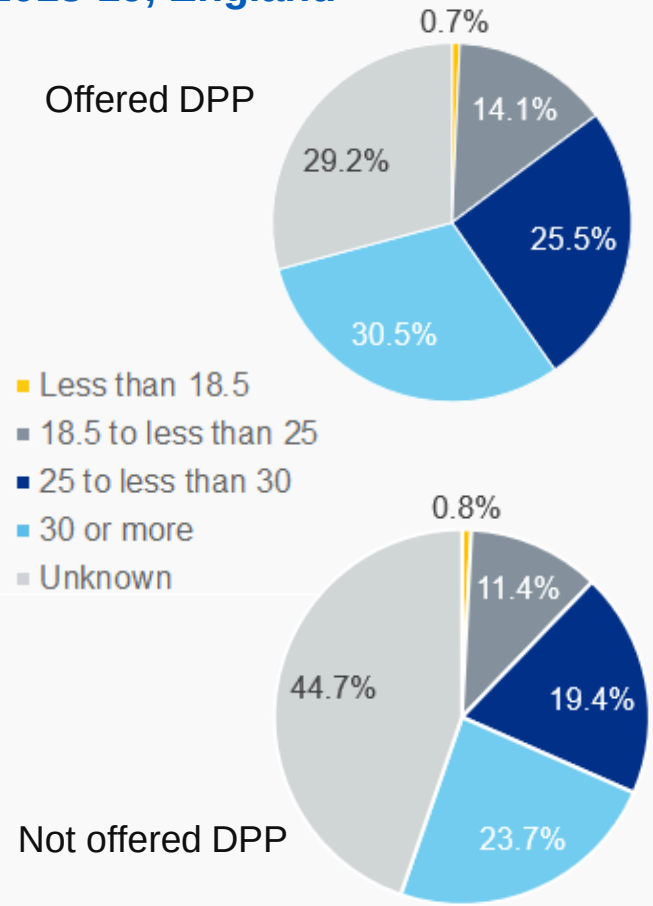
In England, people with NDH are **more likely** to be offered a DPP place, if they are from a **more deprived** area.

23 per cent of people from the second most deprived quintile were offered DPP (21 per cent of people with NDH are from this quintile). 17 per cent of people from the least deprived quintile were offered DPP (19 per cent of people with NDH are from this quintile).

Notes:
1. People included: All ages
2. People included: registered at a GP practice that participated in NDA 2018-19.

DPP Offers: BMI, Ethnicity

Figure 10: Body Mass Index (BMI), by DPP offer status, GP recorded non-diabetic hyperglycaemia (NDH), 2018-19, England



BMI less than 18.5 – underweight
BMI 18.5 to less than 25 – normal
BMI 25 to less than 30 – overweight
BMI 30 or more – obese

Table 10: Ethnicity, by DPP offer status, GP recorded non-diabetic hyperglycaemia (NDH), 2018-19, England

Ethnicity	NDH: Offered DPP		NDH: Not offered DPP	
	Number	Per cent	Number	Per cent
White	235,135	61.6	954,520	68.4
Asian	64,715	16.9	125,750	9.0
Black	22,825	6.0	53,730	3.8
Mixed	5,065	1.3	12,655	0.9
Other	5,715	1.5	11,140	0.8
Not Stated	4,380	1.1	15,625	1.1
Unknown	44,030	11.5	222,805	16.0

Source: NHS Digital

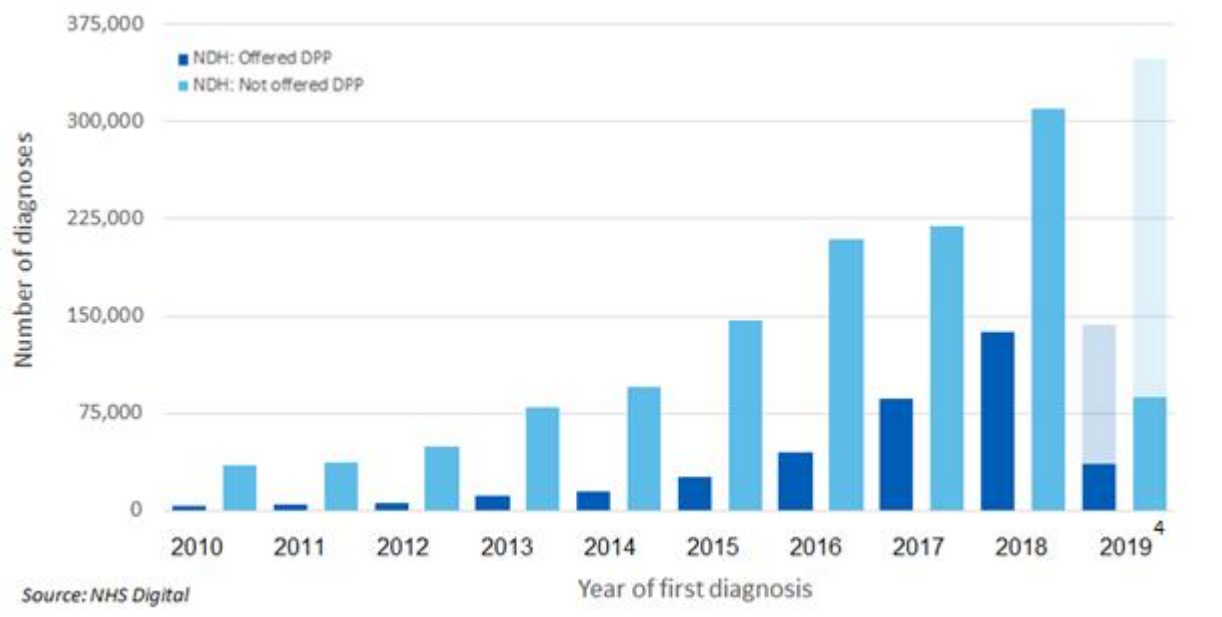
The people offered DPP are **more likely** to be of Black or Asian ethnicity and are **more likely** to have a recently recorded BMI than people without a DPP offer.

Notes:
1. People included: All ages
2. People included: registered at a GP practice that participated in NDA 2018-19.

DPP Offers: Year of diagnosis

Figure 11/Table 11[1,2,4]: Year of first diagnosis[3], by DPP offer status, GP recorded non-diabetic hyperglycaemia (NDH), 2018-19, England

People whose first diagnosis of non-diabetic hyperglycaemia took place in **2017 or later**, are **more likely** to have been **offered DPP**, than people with an earlier first diagnosis.



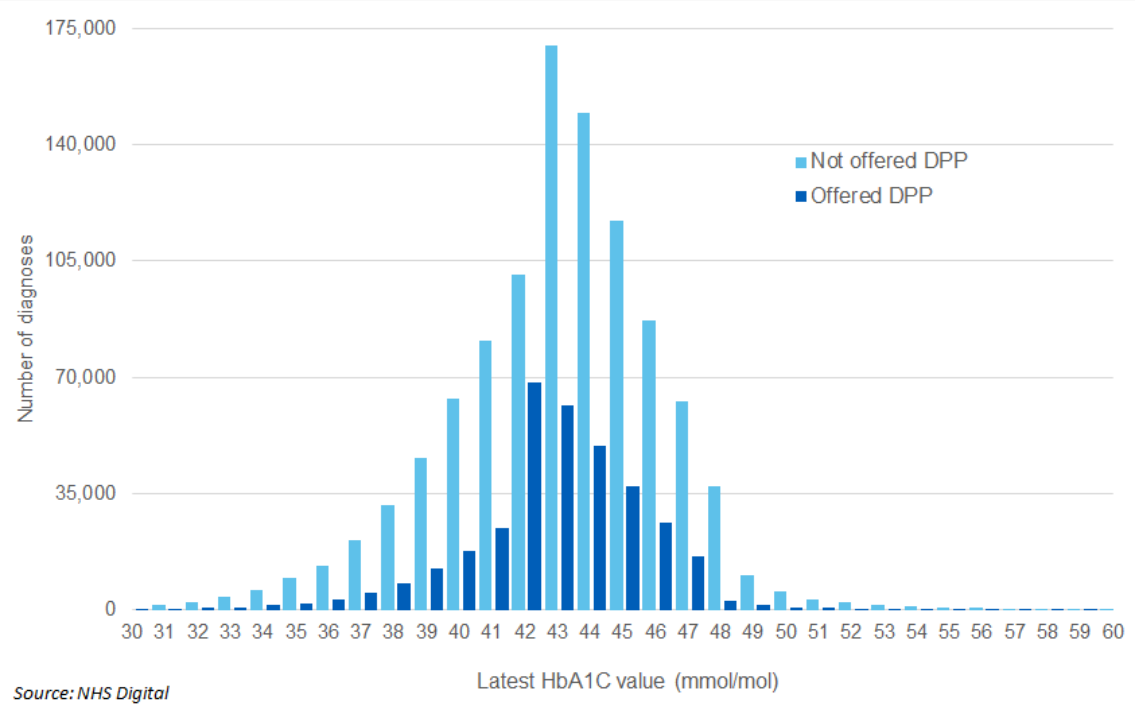
Year of first diagnosis		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
NDH: Offered DPP	Number	3,705	4,160	5,815	10,720	15,140	25,955	44,845	85,690	137,240	35,820
	Per cent	1.0	1.1	1.6	2.9	4.1	7.0	12.2	23.2	37.2	9.7
NDH: Not offered DPP	Number	34,465	37,325	49,030	79,875	95,165	146,490	209,070	219,750	310,335	87,085
	Per cent	2.7	2.9	3.9	6.3	7.5	11.5	16.5	17.3	24.5	6.9

Source: NHS Digital

Notes:
1. People included: All ages
2. People included: registered at a GP practice that participated in NDA 2018-19.
3. People may have multiple dates of diagnosis recorded. People may have experienced elevated levels of blood sugar for some time before they received their first diagnosis of non-diabetic hyperglycaemia.
4. Diagnoses up to Mar 2019 only. Estimated diagnoses for Apr-Dec 2019 shown (shaded) in Figure 11.

DPP Offers: Latest HbA1c value

Figure 12[1,2]: Latest HbA1c value[3], by DPP offer status, GP recorded non-diabetic hyperglycaemia (NDH), 2018-19, England



Almost one in four of the people who had both a value of HbA1c recorded in 2018-19 AND who had been offered a DPP place had a latest HbA1c value recorded which was outside the NDH range (42-<48 mmol/mol).

People who had a value of HbA1c recorded in 2018-19 were most likely to have been offered a DPP place if their HbA1c level was 45-46 mmol/mol (30 per cent).

One in five of the people who had both a value of HbA1c recorded in 2018-19 AND who had been offered a DPP place, had a latest HbA1c value of 42-43 mmol/mol.

Notes:
1. People included: All ages
2. People included: registered at a GP practice that participated in NDA 2018-19.
3. People excluded: where no HbA1c reading was taken in 2018-19 / where a reading was taken but the corresponding value is unknown

Non-Diabetic Hyperglycaemia:

7. Care processes and treatment targets

“Do people with NDH have their health appropriately managed and monitored?”

Care processes and Treatment targets

NICE guidelines[1] recommend that people that have been identified as being at high risk of developing diabetes and have either fasting plasma glucose (FPG) of 5.5-<7.0 mmol/l or HbA1c of 42-<48 mmol/mol, should be offered a blood test, assessment of their weight / BMI and a review of their lifestyle changes at least once a year.

There are currently no recommendations for monitoring other aspects of the health of people with non-diabetic hyperglycaemia, such as blood pressure or cholesterol.

- Do people with NDH have an annual HbA1c or FPG test of their blood sugar?
- Do people with NDH have an annual measurement of their BMI?
- When people with NDH are monitored, what is the level of their
  - HbA1c?
  - Fasting plasma glucose?
  - Blood pressure?
  - Cholesterol?

Results

- In the 2018-19 collection on non-diabetic hyperglycaemia, 57 per cent of people had had recent checks of their blood sugar and BMI.
- The modal person had a HbA1c of 42 – 45 mmol/mol, cholesterol between 4.0 and 5.0 mmol/L and blood pressure between 120/70 and 150/85 mmHg.

Notes:

1. NICE: Type 2 diabetes: prevention in people at high risk (PH38), 2017. Recommendations: 1.6.5-6

What checks are done on people with NDH?

Table 12[1,2,3]: Patient monitoring within the audit period, GP recorded non-diabetic hyperglycaemia (NDH), 2018-19, England

Care processes	Number	Per cent
Blood sugar (any)	1,399,245	78.7
- Fasting plasma glucose	120,085	6.8
- HbA1c	1,377,510	77.5
Body mass index	1,145,430	64.4

Other checks	Number	Per cent
Blood pressure	1,506,160	84.7
Cholesterol	1,242,125	69.9

Source: NHS Digital

Results

57 per cent of people with non-diabetic hyperglycaemia had both recommended care processes in 2018-19 – monitoring of blood sugar (HbA1c or fasting plasma glucose) and BMI checks.

Recommendation 3

GP practices should endeavour to provide frequent checks (annual) of the blood sugar and BMI of people who have been diagnosed with non-diabetic hyperglycaemia.

People with diabetes[4]…

In 2018-19, amongst people with Type 2 diabetes in England, 95.3 per cent had an annual HbA1c check, 88.8 per cent had their BMI measured, 96.2 per cent had their blood pressure taken, and 92.8 per cent had their cholesterol recorded.

Notes:
1. People included: All ages
2. People included: registered at a GP practice that participated in NDA 2018-19.
3. People included: 1,778,085 people were recorded with non-diabetic hyperglycaemia in NDH 2018-19
4. NHS Digital (2019): National Diabetes Audit Report 1 – Care Processes and Treatment Targets 2018-19..

Who has had a recent blood glucose check?

Table 13[1,2]: Blood glucose monitoring[3] within the audit period, by year of first diagnosis[4], GP recorded non-diabetic hyperglycaemia (NDH), 2018-19, England

Year of first diagnosis	Total	Tested in audit period	
		Number	Per cent
Unknown	435	330	75.9
Pre-2010	139,970	91,605	65.4
2010	38,170	25,015	65.5
2011	41,490	27,325	65.9
2012	54,850	36,760	67.0
2013	90,595	64,210	70.9
2014	110,305	78,400	71.1
2015	172,440	125,415	72.7
2016	253,915	186,375	73.4
2017	305,440	223,555	73.2
2018	447,575	422,340	94.4
2019	122,905	117,915	95.9
Total	**1,778,085**	**1,399,245**	**78.7**

Source: NHS Digital

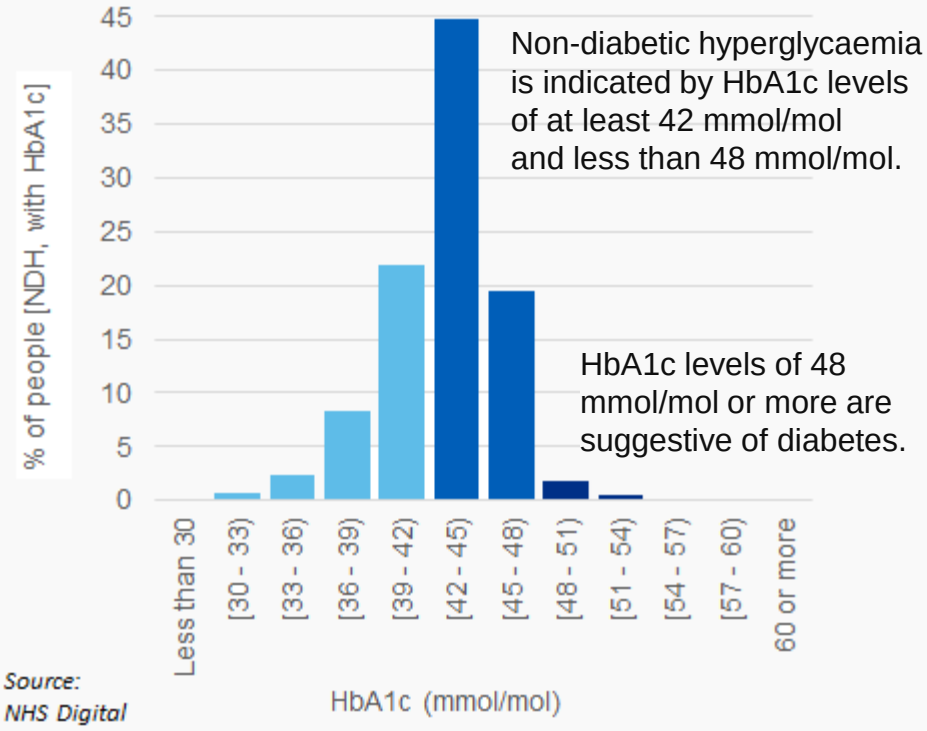
People with more recent diagnoses of NDH are more likely to have had a blood glucose test in the audit period.

95 per cent of people diagnosed in 2018-19 had a blood glucose test in that period.

Notes:
1. People included: All ages
2. People included: registered at a GP practice that participated in NDA 2018-19.
3. Blood glucose monitoring may include a HbA1c or a fasting plasma glucose test.
4. People may have multiple dates of diagnosis recorded.

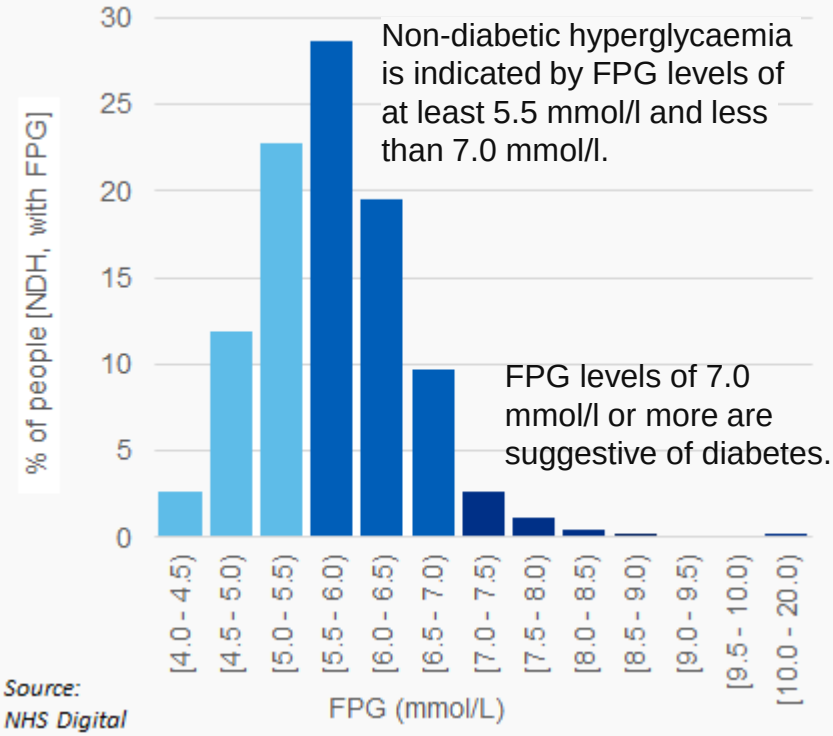
Checks: HbA1c and fasting plasma glucose

Figure 13: Latest known HbA1c readings[1,2,3] taken within the audit period, GP recorded non-diabetic hyperglycaemia (NDH), 2018-19, England



Source:
NHS Digital

Figure 14: Latest known fasting plasma glucose readings[1,2,3] taken within the audit period, GP recorded non-diabetic hyperglycaemia (NDH), 2018-19, England

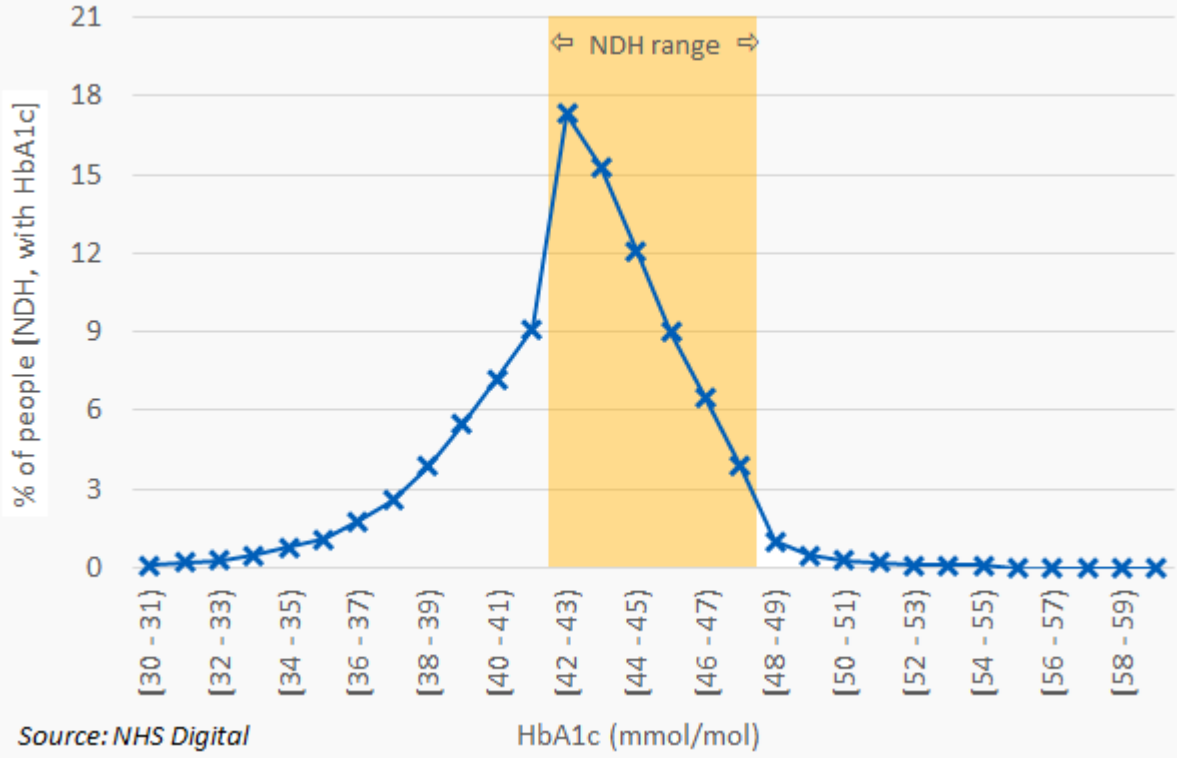


Source:
NHS Digital

Notes:
1. People included: All ages
2. People included: registered at a GP practice that participated in NDA 2018-19.
3. People excluded: where no reading was taken in 2018-19 / where a reading was taken but the corresponding value is unknown

Checks: HbA1c and fasting plasma glucose

Figure 15: Latest known HbA1c readings[1,2,3] taken within the audit period (detailed), GP recorded non-diabetic hyperglycaemia (NDH), 2018-19, England



Source: NHS Digital

HbA1c levels of 48 or more mmol/mol are suggestive of diabetes. HbA1c lower than 48 mmol/mol, but at least 42 mmol/mol is indicative of non-diabetic hyperglycaemia.

64 per cent of people had a most recent HbA1c reading in the non-diabetic hyper-glycaemia range (42 – <48 mmol/mol).

Most of those HbA1c readings were at the lower end of that range (17 per cent at 42 – <43 mmol/mol).

One third of people had a most recent HbA1c reading below the non-diabetic hyper-glycaemia range.

Notes:
1. People included: All ages
2. People included: registered at a GP practice that participated in NDA 2018-19.
3. People excluded: where no reading was taken in 2018-19 / where a reading was taken but the corresponding value is unknown

Who has DPP-eligible blood glucose levels?

Table 14[1,2]: DPP eligible blood glucose readings[3] within the audit period, by year of first diagnosis[4], GP recorded non-diabetic hyperglycaemia (NDH), 2018-19, England

Year of first diagnosis	Total	Eligible for DPP in audit period	
		Number	Per cent
Unknown	435	220	50.6
Pre-2010	139,970	43,615	31.2
2010	38,170	12,645	33.1
2011	41,490	13,905	33.5
2012	54,850	20,125	36.7
2013	90,595	36,680	40.5
2014	110,305	48,270	43.8
2015	172,440	79,285	46.0
2016	253,915	119,895	47.2
2017	305,440	147,030	48.1
2018	447,575	395,270	88.3
2019	122,905	112,455	91.5
Total	**1,778,085**	**1,029,395**	**57.9**

Source: NHS Digital

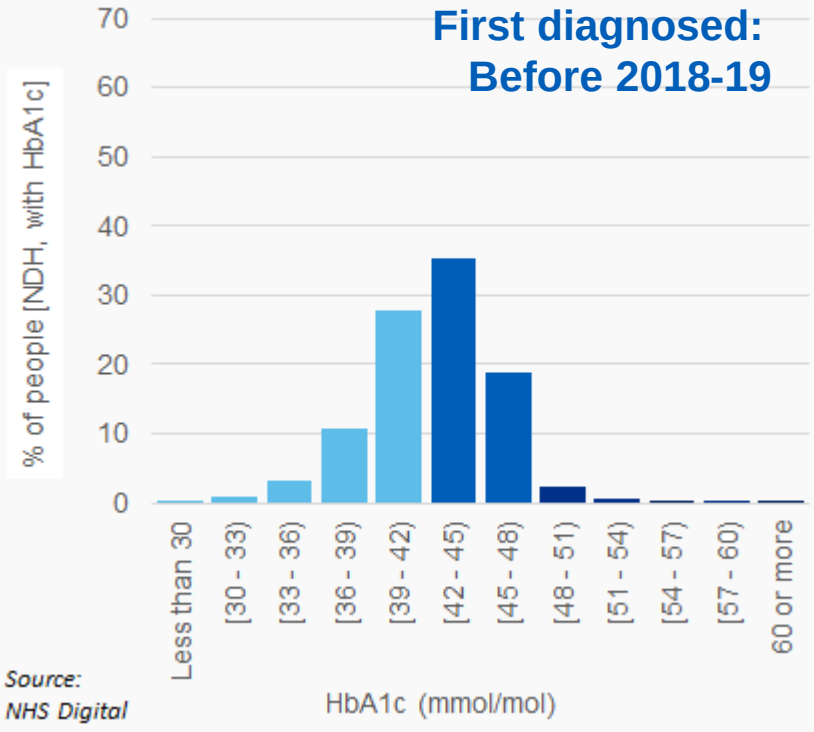
Less than half of people first diagnosed before 2018 had a blood glucose reading in 2018-19 which was appropriate for entry to the Diabetes Prevention Programme.

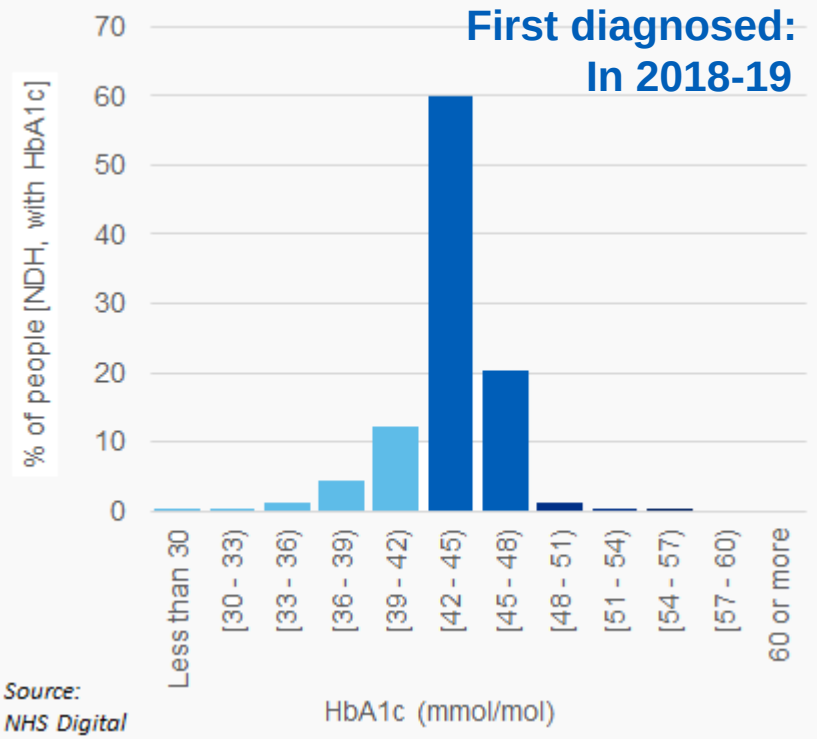
89 per cent of people diagnosed in 2018-19 had a blood glucose reading in that period which would make them eligible for the Diabetes Prevention Programme.

Notes:
1. People included: All ages
2. People included: registered at a GP practice that participated in NDA 2018-19.
3. DPP eligible blood glucose reading: HbA1c test result 42-<48 mmol/mol or fasting plasma glucose test result 5.5-<7.0 mmol/l (All readings taken in 2018-19, not restricted to the latest known readings).
4. People may have multiple dates of diagnosis recorded.

Checks: HbA1c, by recent NDH diagnosis

Figure 16: Latest known HbA1c readings[1,2,3] taken within the audit period, by recent NDH diagnosis, GP recorded non-diabetic hyperglycaemia (NDH), 2018-19, England





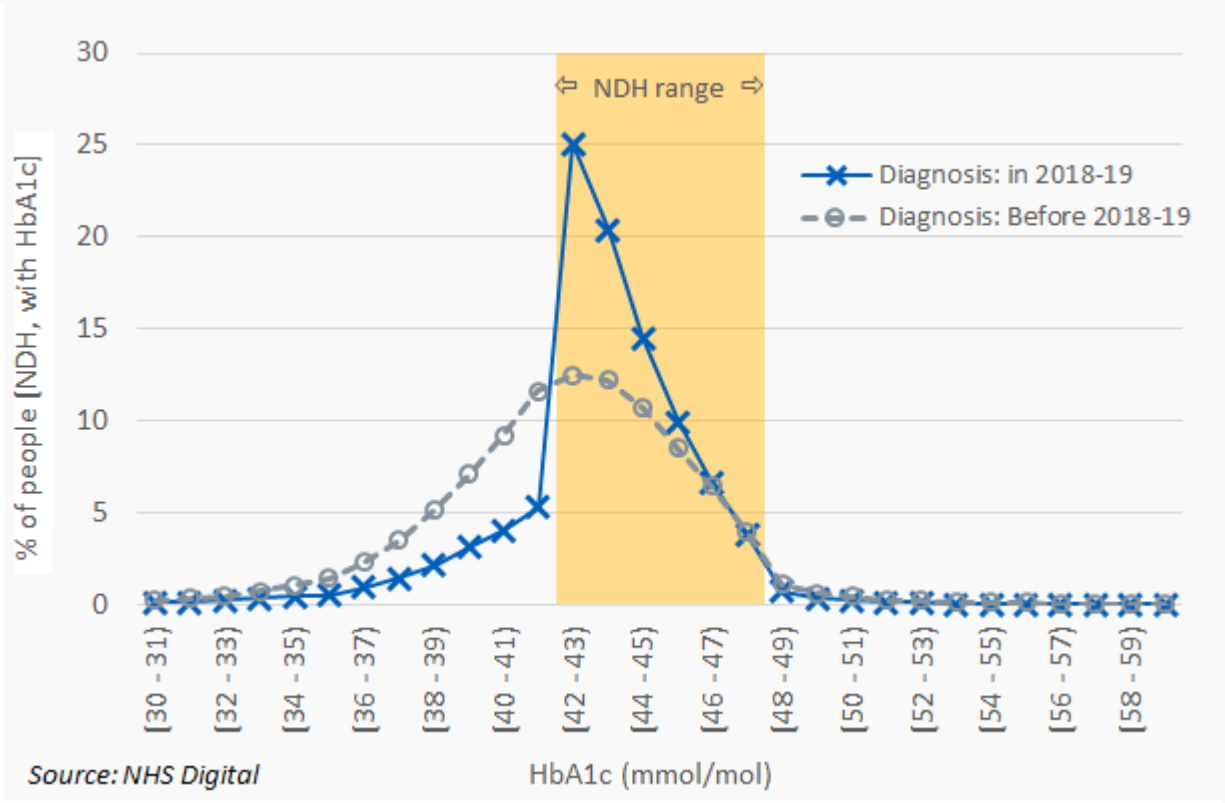
80 per cent of people first diagnosed in 2018-19 have a latest HbA1c value between 42-<48 mmol/mol compared to 54 per cent in people diagnosed earlier.

Notes:

1. People included: All ages
2. People included: registered at a GP practice that participated in NDA 2018-19.
3. People excluded: where no reading was taken in 2018-19 / where a reading was taken but the corresponding value is unknown

Checks: HbA1c, by recent NDH diagnosis

Figure 17: Latest known HbA1c readings[1,2,3] taken within the audit period (detailed), by recent NDH diagnosis, GP recorded non-diabetic hyperglycaemia (NDH), 2018-19, England



HbA1c levels of 48 or more mmol/mol are suggestive of diabetes. HbA1c lower than 48 mmol/mol, but at least 42 mmol/mol is indicative of non-diabetic hyperglycaemia.

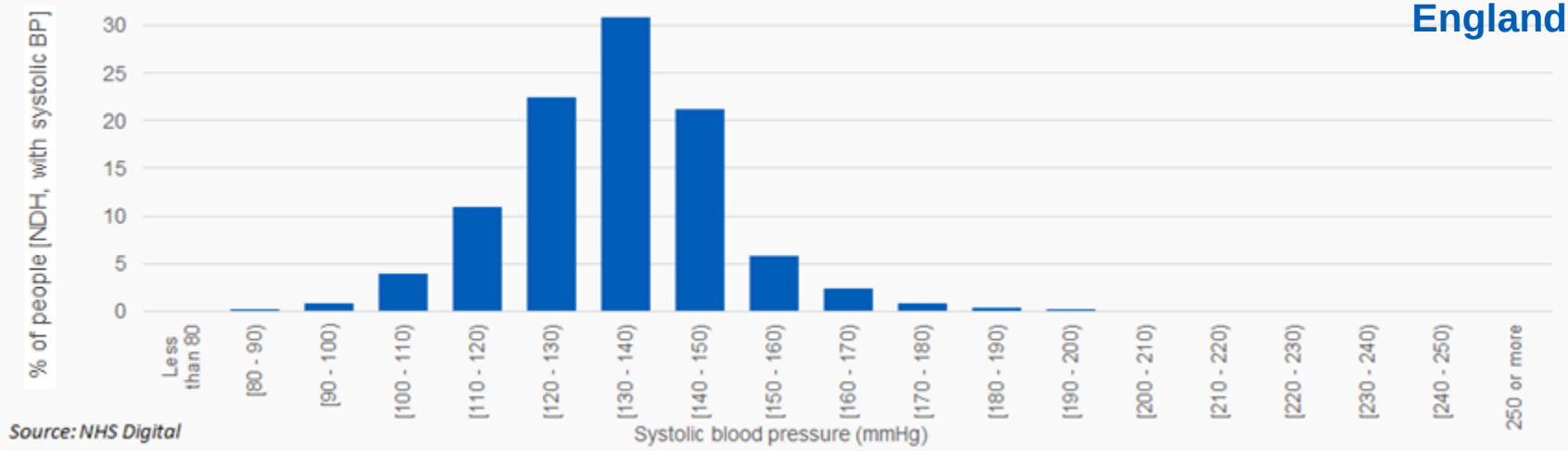
80 per cent of people first diagnosed in 2018-19 had a most recent HbA1c reading in the non-diabetic hyperglycaemia range (42 – <48 mmol/mol).

People who were first diagnosed before 2018-19, were less likely to have a most recent HbA1c reading in the non-diabetic hyperglycaemia range (54 vs. 80 per cent) and more likely for this value to be lower (43 vs. 18 per cent) .

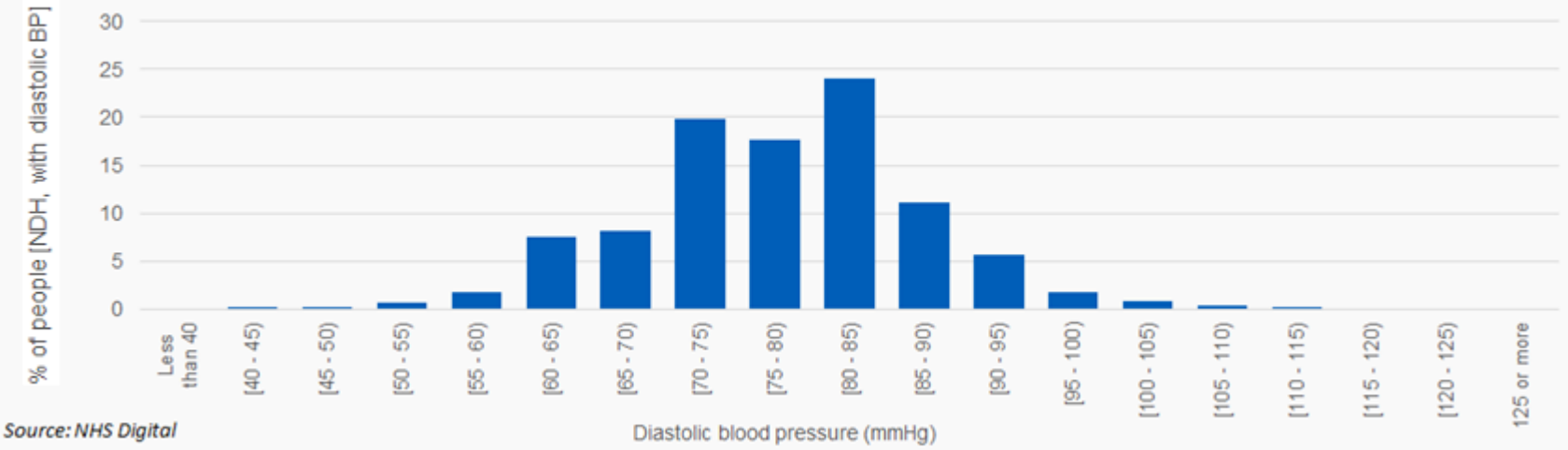
Notes:
1. People included: All ages
2. People included: registered at a GP practice that participated in NDA 2018-19.
3. People excluded: where no reading was taken in 2018-19 / where a reading was taken but the corresponding value is unknown

Checks: Blood pressure, systolic & diastolic

Figure 18: Latest known systolic[1,2,3] and diastolic[1,2,3] blood pressure readings taken within the audit period, GP recorded non-diabetic hyperglycaemia (NDH), 2018-19, England



Source: NHS Digital



Source: NHS Digital

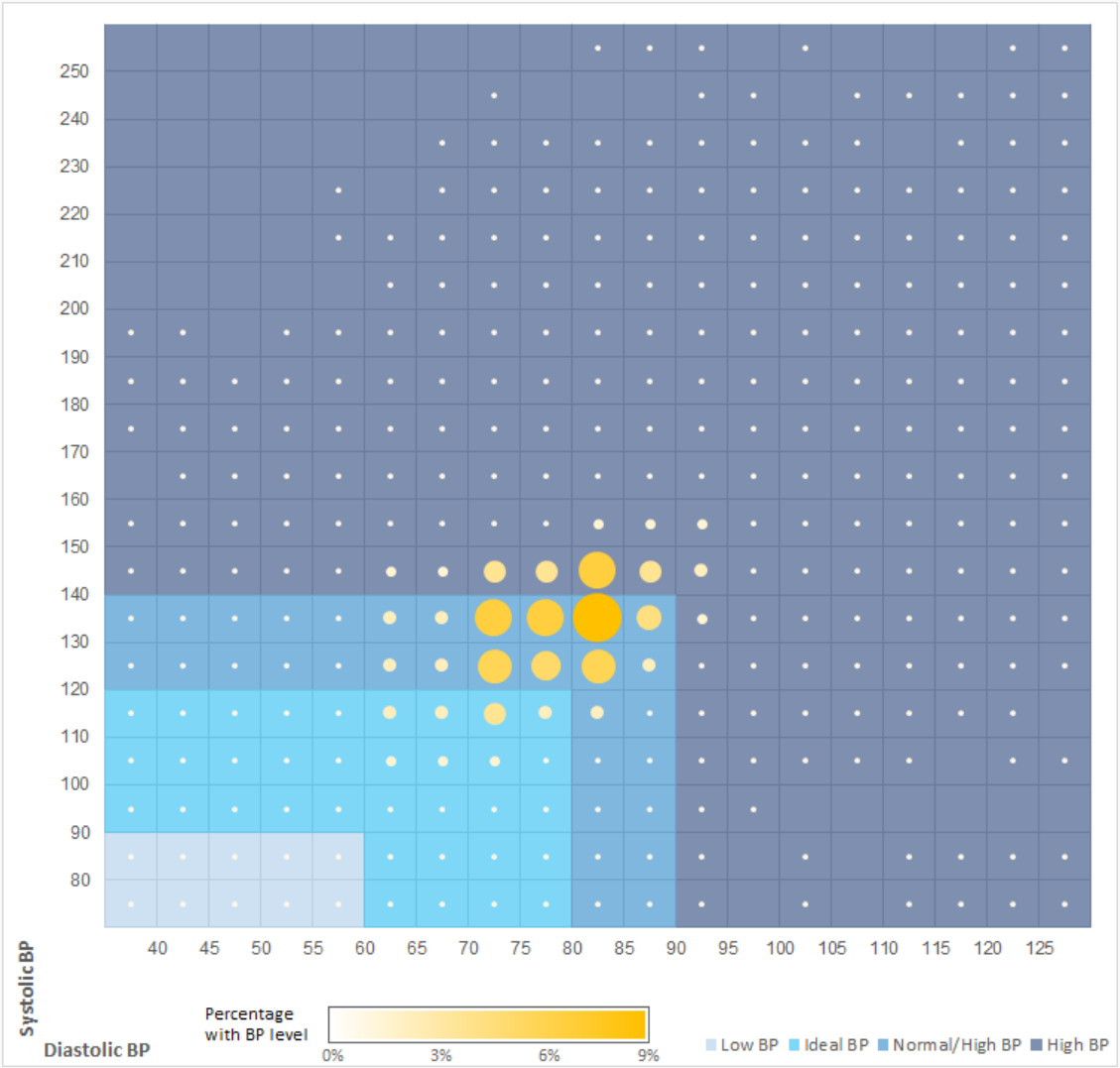
Notes.

1. People included: All ages
2. People included: registered at a GP practice that participated in NDA 2018-19.
3. People excluded: where no reading was taken in 2018-19 / where a reading was taken but the corresponding value is unknown

How to read this figure
Small | White circle = Few people have BP in this range. Large | Amber circle = Many people have BP in this range.

Checks: Blood pressure, overall

Figure 19: Blood pressure[1,2,3] readings taken within the last audit period, GP recorded non-diabetic hyperglycaemia (NDH), 2018-19, England



More than half – 53 per cent – of people with non-diabetic hyperglycaemia that have had their blood pressure measured in 2018-19 have a normal-high blood pressure (between 120/80 and 140/90 mmHg)

More than one third – 34 per cent – of people with non-diabetic hyperglycaemia that have had their blood pressure measured in 2018-19 have a high blood pressure (over 140/90 mmHg).

Approximately one eighth – 13 per cent – of people with non-diabetic hyperglycaemia that have had their blood pressure measured in 2018-19 have an ideal blood pressure (between 90/60 and 120/80 mmHg).

Notes:
1. People included: All ages;
2. People included: Registered at a GP practice that participated in NDA 2018-19;
3. People included: Where values recorded for both diastolic and systolic blood pressure readings in 2018-19.

Checks: Cholesterol

Table 15: Statin prescribing[1,2] for CVD risk reduction in the last audit period, GP recorded non-diabetic hyperglycaemia (NDH), 2018-19, England

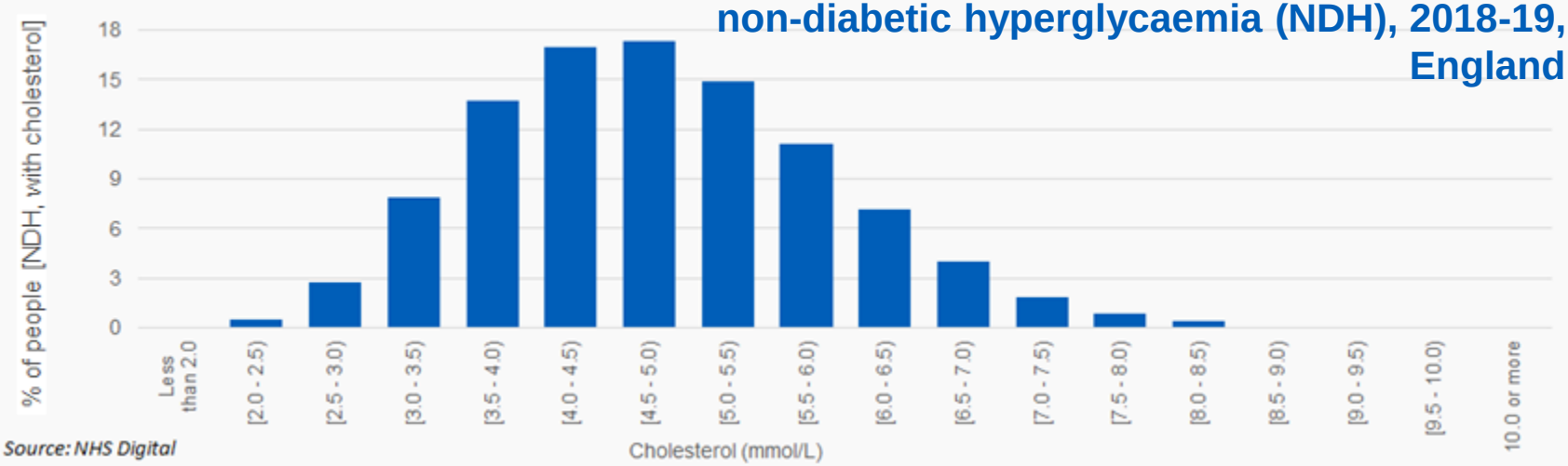
CVD risk reduction	Number	Per cent
Primary prevention	447,680	37.6
Secondary prevention	268,690	81.4
Combined prevention	716,365	47.1

Source: NHS Digital

Notes:
Additional inclusion criteria::
Primary prevention: Aged 40 - 80 years, no history of heart disease.
Secondary prevention: All ages, history of heart disease
Combined prevention: Either in primary or secondary prevention group.

History of heart disease: Admission with angina, heart failure, myocardial infarction or stroke in the last 10 years (2009-10 – 2018-19) or a diagnosis of ischaemic heart disease in their GP record.

Figure 20: Cholesterol[1,2,3] readings taken within the last audit period, GP recorded non-diabetic hyperglycaemia (NDH), 2018-19, England



Source: NHS Digital

Notes:
1. People included: All ages
2. People included: registered at a GP practice that participated in NDA 2018-19.
3. People excluded: where no reading was taken in 2018-19 / where a reading was taken but the corresponding value is unknown

Non-Diabetic Hyperglycaemia:

8. Outcomes and complications

“How often do people with NDH go on to develop Type 2 diabetes?”

“How often do people with NDH experience complications associated with diabetes?”

Developing Type 2 diabetes

People with an elevated level of blood glucose (non-diabetic hyperglycaemia) are at a high risk of developing Type 2 diabetes.

It is intended that by participating in an intensive lifestyle-change programme, people will reduce the chance that they will go on to develop diabetes, or will delay the onset of the condition.

The Diabetes Prevention Programme was introduced recently; and the number of people who have completed the programme is – at present -- insufficient to assess its impact on any subsequent development of diabetes.

Later reports will examine the effectiveness of DPP in preventing the onset of diabetes.

There have been a number of cohort studies investigating the risk of developing diabetes from a state of hyperglycaemia.

Although the use of different definitions of pre-diabetes can make comparisons between studies difficult, one review[1] of several studies found annualised incident rates of between 5 and 10 per cent.

Another meta-analysis[2] found a pooled incident rate of 35.6 per 1000 person-years amongst studies looking at people whose initial HbA1c was 42-46 mmol/mol.

How many people with NDH have gone on to develop Type 2 diabetes?

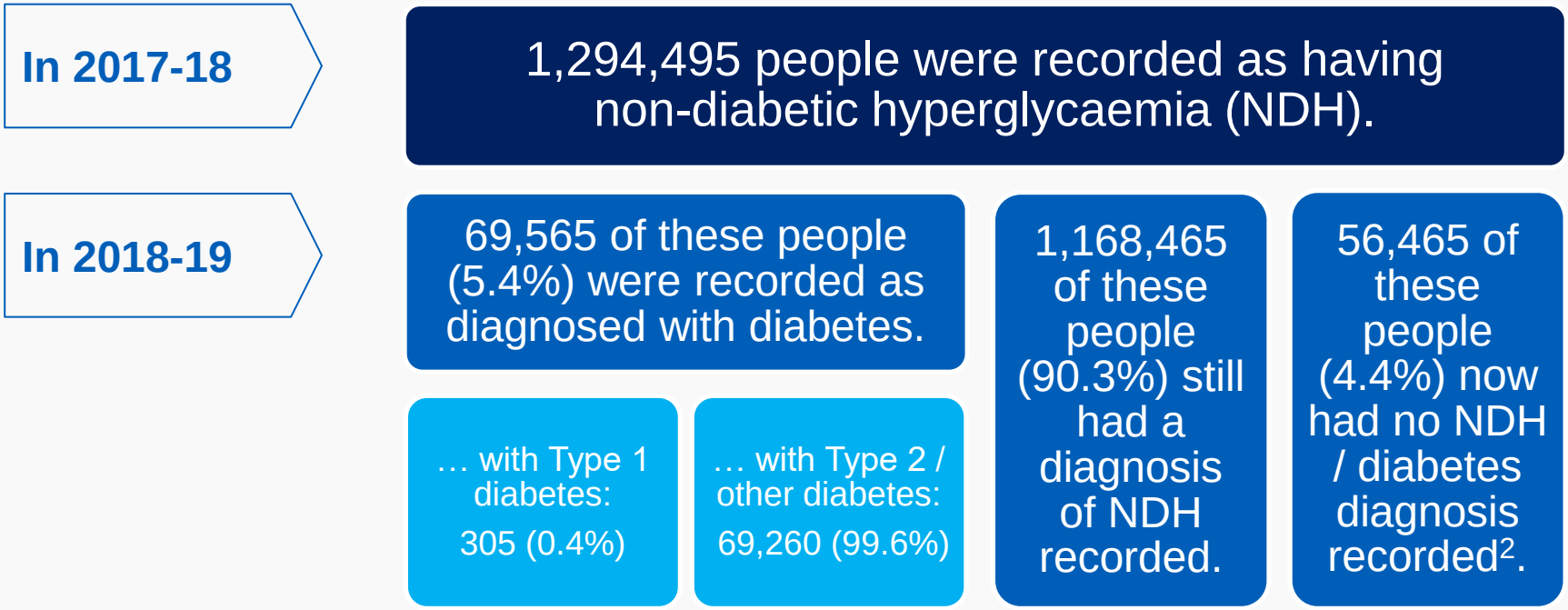
How many people with Type 2 diabetes have previously been diagnosed with NDH?

Notes:

1. Annual incidence and relative risk of diabetes in people with various categories of dysglycemia: a systematic overview and meta-analysis of prospective studies.; Gerstein HC et al; Diabetes Res Clin Pract; 2007
2. Progression rates from HbA_{1c} 6.0–6.4% and other prediabetes definitions to type 2 diabetes: a meta-analysis; Morris DH et al; Diabetollogia; 2013

Developing diabetes: NDH 2017/18

Figure 21: Follow up[1] of NDH / diabetes status from the last audit period, GP recorded non-diabetic hyperglycaemia (NDH), 2017-18 / 2018-19, England



One in twenty of the 1.3 million people known to have NDH in 2017-18 are now known to have diabetes. Almost all of the people who went on to develop diabetes were diagnosed with Type 2 and other diabetes.

1. Includes all people diagnosed with NDH by 31 March 2018, as recorded in the data taken for the 2017-18 DPP report. Includes people registered at GP practices in 2017-18 that did not participate in the 2018-19 NDA collection. The diabetes date of diagnosis in the 2018-19 data may be earlier than the non-diabetic hyperglycaemia date of diagnosis in the 2017-18 data. **2.** It is not known why people no longer have an NDH diagnosis recorded. For example, their diagnosis may have been removed, or their records may not have been collected – i.e. if they have moved to a GP practice not participating in the 2018-19 collection, or died.

History of NDH: NDA 2018/19

Figure 22: History of NDH / diabetes[1] status in the last audit period, GP recorded Type 2 diabetes (T2DM), 2017-18 / 2018-19, England

In 2018-19

3,033,505 people were recorded as having a diagnosis of Type 2 (or other) diabetes.

In 2017-18

- 67,850 (2.2%) were currently diagnosed with NDH.
- 2,764,615 (91.1%) were already diagnosed with diabetes.
- 201,040 (6.6%) had no recorded NDH / diabetes diagnosis.

In 2018-19

293,175 people were recorded as having a recent (2018-19) diagnosis of Type 2 (or other) diabetes.

In 2017-18

- 60,880 (20.8%) were currently diagnosed with NDH.
- 73,975 (25.2%) were already[2] diagnosed with diabetes.
- 158,320 (54.0%) had no recorded NDH / diabetes diagnosis.

1. Includes people with diabetes, as recorded in the data taken for the 2018-19 NDA report, from GP practices in England, excluding those diagnosed with Type 1 diabetes. Includes people registered at GP practices in 2018-19 that did not participate in the 2017-18 NDA collection. The diabetes date of diagnosis in the 2018-19 data may be earlier than the non-diabetic hyperglycaemia date of diagnosis in the 2017-18 data.
2. NDA 2018-19 and NDA 2017-18 are 15 month audit periods. A person diagnosed with diabetes in Jan-Mar 2018 would be newly diagnosed in both the 2018-19 and 2017-18 collections.

Developing diabetes-related complications

People with diabetes are at a higher risk of developing a number of different complications which require hospital admission. This includes cardiovascular complications such as angina, myocardial infarction, heart failure and stroke; as well as complications specific to diabetes, including diabetic ketoacidosis (DKA), lower limb amputation and End Stage Kidney Disease (ESKD).

People with non-diabetic hyperglycaemia may also develop complications resulting from their elevated blood sugar levels.

How many people with non-diabetic hyperglycaemia go on to develop cardiovascular complications?

Checking for complications

Who? Anyone who was included in the 2017-18 NDH collection, whose first diagnosis of non-diabetic hyperglycaemia took place before April 2017.

What? Any of the following complications – angina, myocardial infarction, heart failure, stroke – which was recorded during an episode of a person's hospital admission. The complication does not have to be the reason why the person was admitted to hospital. Only complications that involved an admission to hospital are included.

When? Part or all of the hospital stay where the complication took place occurred in April 2017 – March 2018.

Where? The hospital stay in which the complication occurred must have involved a hospital in England. Complications during admissions from hospitals in Wales are not included.

Developing diabetes-related complications

Table 16: One year prevalence[4] of cardiovascular complications of diabetes in people with GP recorded non-diabetic hyperglycaemia[1] (NDH) or Type 2 diabetes[2] (T2DM), 2017-18 (complications)[3], England

Complication	Prevalence in NDH		Prevalence in T2DM	
	Number	Per cent	Number	Per cent
Angina	20,085	2.1	77,710	2.9
Myocardial infarction	3,920	0.4	18,710	0.7
Heart failure	14,885	1.6	72,640	2.7
Stroke	5,695	0.6	24,320	0.9

Source: NHS Digital

In 2017-18, people diagnosed with **NDH** are **less likely** to experience cardiovascular complications than people with **Type 2 diabetes**.

People with a recent diagnosis of Type 2 diabetes (in NDA 2018-19) were more likely to have had no NDH or diabetes diagnosis (54 per cent) already recorded (in NDA/DPP 2017-18) than they were to have had a diagnosis of NDH (21 per cent).

It is likely that those people who developed Type 2 diabetes without a preceding diagnosis of non-diabetic hyperglycaemia had elevated blood glucose levels for some time before being diagnosed with diabetes.

The audit hopes that GP practices continue the impressive increase in identification of people with NDH at high risk of developing Type 2 diabetes. By seeking out NDH there is the opportunity to offer interventions that may delay the onset of Type 2 diabetes and associated cardiovascular complications.

1. People included: All people diagnosed with NDH by 31 March 2017, as recorded in the data taken for the 2017-18 DPP report.
2. People included: All people in NDA 2017-18, diagnosed by 31 March 2017, who did not have type 1 diabetes.
3. Hospital episodes included: All England hospital episodes ending in the 2017-18 involving the specified complication(s).
4. Prevalence figures have not been standardised for the age/sex of the population.

Non-Diabetic Hyperglycaemia:

9. Current limitations and future plans

Current limitations and future plans

There is not yet sufficient data to make an assessment on whether the behaviour change programmes are having an impact on reducing weight, progression to Type 2 Diabetes and other cardiovascular risk factors.

This will be investigated in future reports on the Diabetes Prevention Programme.

Future plans

The GP data, linked to the behaviour change programme provider data, will be used to investigate the full journey of diagnosis through education and subsequent outcomes.

Non-Diabetic Hyperglycaemia, 2018-19

Prepared in collaboration with:

HQIP
Healthcare Quality Improvement Partnership

The Healthcare Quality Improvement Partnership (HQIP) is led by a consortium of the Academy of Medical Royal Colleges, the Royal college of Nursing, and National Voices. Its aim is to promote quality improvement in patient outcomes, and in particular, to increase the impact that clinical audit, outcome review programmes and registries have on healthcare quality in England and Wales. HQIP holds the contract to commission, manage, and develop the National Clinical Audit and Patient Outcomes Programme (NCAPOP), comprising around 40 projects covering care provided to people with a wide range of medical, surgical and mental health conditions. The programme is funded by NHS England, the Welsh Government and, with some individual projects, other devolved administrations, and crown dependencies. www.hqip.org.uk/national-programmes

NHS Digital

NHS Digital is the trading name for the Health and Social Care Information Centre (HSCIC). NHS Digital managed the publication of the 2018-19 annual report.

DIABETES UK
KNOW DIABETES. FIGHT DIABETES.

Diabetes UK is the charity leading the fight against the most devastating and fastest growing health crisis of our time, creating a world where diabetes can do no harm.

Supported by:

Public Health England

The National Cardiovascular Intelligence Network (NCVIN) is a partnership of leading national cardiovascular organisations which analyses information and data and turns it into meaningful timely health intelligence for commissioners, policy makers, clinicians and health professionals to improve services and outcomes.

Non-Diabetic Hyperglycaemia, 2018-19

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