Appendix 2

Data completeness and statistical representativeness of the 2019/20 audit

One hundred and sixty-six **PDUs** from a total of 173 (96.0%) across England and Wales, submitted information to the 2019/20 audit. Table 1 shows five regional networks with 100% participation.

Table 1: Number of PDUs participating in the 2019/20 audit, by country and regional network.

	PDUs in 2019/20		
	Total PDUs (N)	Participation (n)	Participation (%)
England and Wales	**173**	**166**	**96.0**
England	161	154	95.7
Wales	12	12	100.0
East Midlands	10	10	100.0
East of England	17	16	94.1
London and South East	38	36	94.7
North East and North Cumbria	13	13	100.0
North West	20	19	95.0
South Central	16	16	100.0
South West	11	10	90.9
West Midlands	19	19	100.0
Yorkshire and Humber	17	15	88.2

Table 2 shows that the units participating in the 2019/20 audit account for more than 95% of the population of children and young people with diabetes in all the regions and overall, when considering the data submitted to the audit in 2018/19. The table also shows that the number of children submitted by the participating units increased 1.1% with respect to 2018/19 (column E), and the overall reduction in the number of children included in the audit was 3% (column F).

Table 2: Variation in the number of children and young people included in the audit, all types of diabetes, by country and regional network

	2018/19			2019/20		
	Total CYP	Number of CYP in participating units	Proportion (%)	Total CYP submitted to the audit	% variation within participating units compared to 2018/19	% total variation compared to 2018/19
England and Wales	**30,155**	**28,920**	**95.9**	**29,242**	↑ 1.1	↓ (-3.0)
England	28,676	27,441	95.7	27,780	↑ 1.2	↓ (-3.1)
Wales	1,479	1,479	100.0	1,462	↓ (-1.2)	↓ (-1.2)
East Midlands	2,038	2,038	100.0	2,021	↓ (-0.8)	↓ (-0.8)
East of England	3,231	2,990	92.5	3,067	↑ 2.6	↓ (-5.1)

London and South East	6,732 *	6,293	93.5	6,487	↑ 3.1	↓ (-3.6)
North East and North Cumbria	1,650	1,650	100.0	1,668	↑ 1.1	↑ 1.1
North West	3,756	3,649	97.2	3,679	↑ 0.8	↓ (-2.1)
South Central	2,738 *	2,738	100.0	2,731	↓ (-0.3)	↓ (-0.3)
South West	2,385	2,149	90.1	2,133	↓ (-0.7)	↓ (-10.6)
West Midlands	3,206	3,206	100.0	3,253	↑ 1.5	↑ 1.5
Yorkshire and Humber	2,940	2,728	92.8	2,741	↑ 0.5	↓ (-6.8)

* Totals and variation reported for South Central and London and South East reflect the transition of two units (Worthing Hospital and St Richard's Chichester) from the London and South East network to the South Central network in 2019/20.

Type 1 diabetes

Comparison of the demographic characteristics of the children and young people with type 1 diabetes included in the 2019/20 audit and 2018/19 audit is presented in Table 3. The table shows that the units participating in the 2019/20 audit and those who did not had a similar demographic composition in terms of age groups, diabetes duration and gender, but were different in terms of ethnicity and deprivation.

Table 3: Characteristics of children and young people with Type 1 diabetes included in the 2018/19 and 2019/20 NPDA

Type 1 diabetes	2019/20	2018/19			Pearson Chi-square test of significance
		All	Participating units	Non-participating units in 2019/20	
Number of children and young people	**27,653**	**28,597**	**27,453**	**1,144**	
Age groups (%)					
0-4 years old	5.2	5.4	5.4	5.1	Pearson chi^2(3) Pr = 0.752
5-9 years old	21.4	21.7	21.6	22.8	
10-14 years old	42.3	41.3	41.4	40.5	
15+ years old	31.1	31.6	31.6	31.6	
missing	0.0	0.0	0.0	0.0	
Diabetes duration (%)					
Less than 1 year	21.2	20.8	20.8	21.1	Pearson chi^2(6) Pr = 0.178
1-2 years	21.0	21.5	21.6	20.7	
3-4 years	18.1	17.6	17.5	19.1	
5-9 years	28.3	28.1	28.2	25.9	
10-14 years	10.1	10.5	10.5	11.0	
15+ years	1.2	1.3	1.2	2.2 [+]	
missing	0.1	0.2	0.2	*	
Gender (%)					
Boys	52.2	52.0	52.1	49.7	Pearson chi^2(3) Pr = 0.149
Girls	47.6	47.8	47.7	50.3	
Not specified/unknown	0.2	0.2	0.2	0.0	
missing	0.0	0.0	0.0	0.0	

Ethnicity (%)					
White	80.1	79.5	79.8	72.8	Pearson chi²(6) Pr = 0.000
Asian	6.2	6.3	6.2	8.7	
Black	3.8	3.7	3.5	7.4	
Mixed	3.1	2.9	2.9	2.5	
Other	2.0	1.9	1.7	4.9	
Not stated/unknown	4.8	5.6	5.7	3.4	
missing	0.0	0.2	0.2	0.4	
Deprivation (%)					
Most deprived	23.0	22.6	22.9	14.8	Pearson chi²(5) Pr = 0.000
Second most deprived	20.2	19.9	19.9	20.0	
Third least deprived	19.1	19.0	18.9	21.2	
Second least deprived	18.6	19.2	19.0	22.9	
Least deprived	19.0	19.2	19.2	20.7	
missing	0.1	0.2	0.2	0.4	

* indicates a number less than 5 which has been suppressed

+ results merged to mask a number <5

Table 4 shows that in 2018/19 there were not significant differences between the HbA1c outcomes of the children and young people within the participating units and the no-participating units. On the other hand, there was a significant difference in terms of the completion rates of key health checks and the proportion of young people receiving all seven key health checks.

Table 4: Outcome differences between participating and no-participating units, 2018/19 audit

	2018/19 audit			
	whole sample	Participating units	Non-participating units	test
Children and young people with all types of diabetes				
n	28,277	27,170	1,107	-
Mean HbA1c (mmol/mol)	64.6	64.5	65.2	t-test Pr >0.05
Median HbA1c (mmol/mol)	61.5	61.5	61.5	Pearson chi²(1) Pr = 0.968
Children and young people with Type 1 diabetes				
n	26,987	25,944	1,043	-
Mean HbA1c (mmol/mol)	65.0	65.0	65.5	t-test Pr > 0.05
Median (mmol/mol)	62.0	62.0	62.0	Pearson chi2(1) Pr = 0.676
n (12+ years old and complete year of care)	13,391	12,838	553	-
Health-checks completion rate	88.5	88.7	84.0	Mann-Whitney Pr =0.000 Pearson chi²(7)

				Pr =0.000
% of CYP receiving all 7 recommended health-checks	55.2	55.5	47.4	Two-sample test of proportions Pr <0.05

Linear regression was performed to establish whether the case mix within units who participated in the 2019/20 audit was different in terms of their HbA1c outcomes compared to those who did not participate. Table 5 shows how the case-mix adjustment for mean HbA1c in 2018/19 if using only data from the participating units (column B) or the no-participating units (column C). There is only a statistically significant change across the three groups when considering ($\alpha = 0.05$), with the difference between boys and girls being smaller in the group of participating units and larger in the group of non-participating units.

Table 5: Case-mix regression results for three groups in 2018/19: Whole sample, units participating in 2019/20, and units not participating in the 2019/20 NPDA

2018/19							
	(A)		(B)		(C)		(D)
Type 1 diabetes	Linear regression (HbA1c mmol/mol) whole sample (n = 26,900)		Linear regression (HbA1c mmol/mol) participating units in 2019/20 (n = 25,864)		Linear regression (HbA1c mmol/mol) Non-participating units in 2019/20 (n = 1,036)		Chi-squared (P-value)
	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value	
Boys (cf girls)	-0.84 (-1.21 to -0.47)	0.000	-0.76 (-1.14 to -0.37)	0.000	-2.81 (-4.77 to -0.86)	0.005	A-B (0.029) A-C (0.042) B-C (0.042)
Age (in whole years)	0.95 (0.89 to 1.00)	0.000	0.94 (0.89 to 1.00)	0.000	1.10 (0.83 to 1.39)	0.000	A-B (0.357) A-C (0.271) B-C (0.273)
Duration (in whole years)	0.61 (0.55 to 0.67)	0.000	0.62 (0.55 to 0.68)	0.000	0.46 (0.19 to 0.73)	0.001	A-B (0.368) A-C (0.294) B-C (0.296)
Ethnic group (cf White)							
Asian	0.61 (-0.17 to 1.38)	0.124	0.44 (-0.34 to 1.23)	0.267	4.18 (0.51 to 7.85)	0.036	A-B (0.108) A-C (0.065) B-C (0.067)
Black	4.59 (3.39 to 5.79)	0.000	4.29 (3.06 to 5.51)	0.000	8.30 (3.02 to 13.6)	0.002	A-B (0.126) A-C (0.150) B-C (0.150)
Mixed	2.90 (1.70 to 4.10)	0.000	2.71 (1.51 to 3.92)	0.000	8.30 (-0.04 to 16.6)	0.051	A-B (0.204) A-C (0.194) B-C (0.194)
Other	-1.23 (-2.64 to 0.19)	0.089	-1.68 (-3.17 to -0.19)	0.027	2.80 (-1.68 to 7.27)	0.221	A-B (0.060) A-C (0.065) B-C (0.063)

Not stated or unknown	0.21 (-0.63 to 1.05)	0.617	0.10 (-0.75 to 0.95)	0.826	4.42 (-1.04 to 9.88)	0.113	A–B (0.071) A–C (0.127) B–C (0.125)
Deprivation (cf most deprived)							
Second most deprived	-2.07 (-2.68 to -1.45)	0.000	-2.00 (-2.63 to -1.37)	0.000	-5.09 (-8.86 to -1.33)	0.008	A–B (0.285) A–C (0.109) B–C (0.112)
Third least deprived	-3.41 (-4.02 to -2.79)	0.000	-3.30 (-3.92 to -2.68)	0.000	-7.42 (-11.10 to -3.74)	0.000	A–B (0.100) A–C (0.300) B–C (0.031)
Second least deprived	-5.07 (-5.67 to -4.47)	0.000	-5.03 (-5.64 to -4.42)	0.000	-7.81 (-11.46 to -4.17)	0.000	A–B (0.495) A–C (0.134) B–C (0.140)
Least deprived	-6.64 (-7.23 to -6.05)	0.000	-6.56 (-7.16 to -5.96)	0.000	-9.85 (-13.36 to -6.33)	0.000	A–B (0.161) A–C (0.070) B–C (0.071)
Constant	54.43 (53.78 to 55.08)	0.000	54.39 (53.73 to 55.05)	0.000	56.49 (52.77 to 60.22)	0.000	A–B (0.571) A–C (0.268) B–C (0.276)

Type 2 diabetes

Comparison of the demographic characteristics of the children and young people with type 2 diabetes included in the 2019/20 audit and 2018/19 audit is presented in Table 6. The table shows that similarly to comparison of those with type 1 diabetes, the units participating in the 2019/20 audit and those who did not had a similar demographic composition in terms of age groups, diabetes duration and gender, but were different in terms of ethnicity and deprivation.

Table 6: Characteristics of children and young people with Type 2 diabetes

Type 2 diabetes	2019/20	2018/19			
		All	Participating units	No-participating units	Test
Number of children and young people	**866**	**790**	**753**	**37**	
Age groups (%)					
0-4 years old	0.0	0.0	0.0	0.0	Pearson chi²(2) Pr= 0.452
5-9 years old	2.5	2.4	2.4	*	
10-14 years old	38.8	39.6	40.1	32.4 +	
15+ years old	58.7	58.0	57.5	67.6	
missing	0.0	0.0	0.0	0.0	
Diabetes duration (%)					
Less than 1 year	45.5	45.2	44.9	51.4	Pearson chi²(5)
1-2 years	31.0	34.9	35.6	21.6	

3-4 years	16.1	12.7	12.4	27.0 [+]	Pr= 0.440
5-9 years	5.2	5.3	5.2	*	
10-14 years	1.0	0.4	*	0.0	
15+ years	0.1	0.0	0.0	0.0	
missing	1.2	1.5	2.0 [+]	0.0	
Gender (%)					
Boys	35.5	31.4	31.5	29.7	Pearson chi^2(2) Pr= 0.902
Girls	64.3	68.2	68.5 [+]	70.3	
Not specified/unknown	0.2	0.4	*	0.0	
missing	0.0	0.0	0.0	0.0	
Ethnicity (%)					
White	33.1	36.8	36.9	35.1	Pearson chi^2(6) Pr= 0.023
Asian	35.7	35.6	35.9	29.7	
Black	13.6	10.6	10.0	35.2 [+]	
Mixed	5.8	5.3	5.2	*	
Other	3.8	3.0	3.2	0.0	
Not stated/unknown	8.0	8.0	8.9	0.0	
missing	0.0	0.6	*	*	
Deprivation (%)					
Most deprived	45.5	45.7	47.1	16.2	Pearson chi^2(5) Pr= 0.008
Second most deprived	26.7	26.3	25.9	35.1	
Third least deprived	14.7	14.3	13.9	21.6	
Second least deprived	8.2	8.6	8.1	27.1	
Least deprived	4.6	4.8	4.7	*	
missing	0.4	0.3	0.3	0.0	

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\+ results merged to mask number <5

Table 7 shows that in 2018/19 the median HbA1c amongst children and young people with type 2 diabetes was not significantly different between PDUs who did or did not participate in the 2019/20, however the mean HbA1c for non-participating units was significantly higher. Completion rates of key health checks and the proportion of young people receiving all seven key health checks were also significantly lower for children and young people with type 2 diabetes in the PDUs who did not participate in 2019/20.

Table 7: Outcome differences between participating and no-participating units, 2018/19 audit

	2018/19 audit			
	whole sample	Participating units	No-participating units	test
Children and young people with Type 2 diabetes				
n	674	645	29	-
Mean HbA1c (mmol/mol)	57.4	56.9	68.3	t-test Pr < 0.05
Median (mmol/mol)	49.5	49.5	61.5	Chi-squared Pr >0.05
n (12+ years old and complete year of care)	470	451	19	-
Health-checks completion rate	77.7	78.6	57.1	Mann-Whitney Pr <0.05 Chi-squared Pr <0.05
% of CYP receiving all 7 recommended health checks	30.9	31.9	5.3	Two-sample test of proportions Pr <0.05