CVDPREVENT Deep Dive: inequalities in cholesterol management by sex for patients with CVD

Department of Health & Social Care

NHS Benchmarking Network

(This report uses data up to December 2023)

Using data to drive cardiovascular disease prevention

HQIP
Healthcare Quality Improvement Partnership

The CVDPREVENT audit is commissioned by the Healthcare Quality Improvement Partnership (HQIP) as part of the National Clinical Audit and Patient Outcomes Programme (NCAPOP). HQIP is led by a consortium of the Academy of Medical Royal Colleges, and the Royal College of Nursing. 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**

The CVDPREVENT audit aims to support quality improvement in the prevention of cardiovascular disease (CVD) in primary care in England.

This report was prepared by the NHS Benchmarking Network (NHSBN) and the National Cardiovascular Intelligence Network (NCVIN) team. NCVIN is based in the Office for Health Improvement and Disparities (OHID), part of the Department for Health and Social Care (DHSC). The audit is delivered in partnership between NHS Digital (now NHS England), NCVIN, and the NHSBN. To ensure patient involvement in the audit, the NHSBN work closely with the Patients Association.

NHS BENCHMARKING NETWORK (NHSBN)

The NHS Benchmarking Network is a member led organisation promoting service improvement in the NHS through benchmarking and sharing good practice. Members are providers and commissioners of NHS services, spanning the acute, community and mental health sectors. The NHSBN team support members in sharing data to compare service provision and performance with the aim of identifying improvement opportunities. In addition, the NHSBN run national clinical audits.

NATIONAL CARDIOVASCULAR INTELLIGENCE NETWORK (NCVIN) - OFFICE FOR HEALTH IMPROVEMENT & DISPARITIES (OHID)

NCVIN interprets and translates complex data for national and local stakeholders, to inform policy and local decision making and to improve cardiovascular services and outcomes for patients. The team produces trustworthy cardiovascular health intelligence products including profiles and specialist analyses that are innovative and focus on user needs.

NHS DIGITAL (NOW NHS ENGLAND)

NHS Digital was the trading name of the Health and Social Care Information Centre, which is the national provider of information, data and IT systems. The team design, develop and operate the national IT and data services that support clinicians at work, help patients get the best care, and use data to improve health and care. NHS Digital merged with NHS England on 1st February 2023. This work uses data provided by patients and collected by the NHS as part of their care and support.

PATIENTS ASSOCIATION

The Patients Association is an independent patient charity campaigning for improvements in health and social care for patients. Uniquely for a charity with a remit covering all health and care issues, it works with patients directly: they are its members and supporters, and also the people who benefit from the charity's help and advice services. Through the Patients Association's helpline they support thousands of people each year with their concerns and queries about the health and social care system. The Patients Association speak to government, the NHS and other stakeholders about patients' priorities and concerns, to ensure the patient voice is heard and acted upon.

Authors: Office for Health Improvement & Disparities (OHID) and NHS Benchmarking Network, March 2023

TABLE OF CONTENTS

EXECUTIVE SUMMARY

CVDPREVENT data highlighted two inequalities in cholesterol management in secondary prevention by sex-

i) females were less likely than males to have a recent prescription for a lipid lowering therapy (LLT)
ii) females were less likely to achieve target cholesterol levels compared to males

These inequalities were present in all age groups, in all geographic regions of England, and were consistent over time.

We further examined these and found that-

i. these inequalities were present across all ethnic groups and deprivation quintiles.
ii. among patients with CVD, females were more likely than males to have never been prescribed an LLT or have been prescribed an LLT in the past, but not recently. Around 200,000 females with CVD had a record of high cholesterol and no recent LLT prescription.
iii. among patients with CVD and a blood cholesterol test in the past year, the proportion of all patients with a reading above threshold was higher for females than males, regardless of the test used.
iv. females with a recent LLT prescription were much more likely to have achieved target cholesterol levels than females with no recent LLT prescription.

Further work is needed to investigate the reasons for these inequalities.

INTRODUCTION

Cardiovascular diseases (CVD) are the leading cause of death among females worldwide.[1] In England and Wales, ischaemic heart diseases and cerebrovascular diseases were the second leading cause of death among females in 2022, accounting for 37,000 deaths.[2] There are inequalities reported between the CVD related care received by males and females in diagnosis, management, or prevention.[3, 4, 5]

Lipid lowering therapies are recommended by the National Institute for Health and Care Excellence (NICE) for the management of cholesterol levels among patients with CVD and, in turn, the prevention of future major adverse cardiovascular events.[6] By looking across indicators in the CVDPREVENT audit, we can highlight two inequalities around cholesterol management:

i. Among patients with CVD, females are less likely than males to have a recent prescription for a lipid lowering therapy (LLT)
ii. Among patients with CVD, females are less likely to achieve target cholesterol levels

These two inequalities are present in all age groups, in all geographic regions of England, and are consistent over time (Home | CVDPREVENT). Our analysis is based on a large cohort (98% of GP practices in England) and the key findings align with existing international evidence. Studies in the United States, Europe, the Middle East and Asia, have also made comparisons between men and women with regards LLTs and cholesterol levels.[7, 8] A study in the United States found that women with CVD were more likely to stop receiving and/or decline LLT prescriptions.[9] Women were found to be less likely

than men to believe statins (the most common form of LLT) are safe or effective and were also less likely to believe that higher cholesterol increased the risk of a heart attack.

The bulk of this report is based on additional analyses of the following two existing CVDPREVENT indicators-

- **CVDP009CHOL**: Percentage of patients aged 18 and over with GP recorded CVD (narrow definition), who are currently treated with lipid lowering therapy.
- **CVDP007CHOL**: Percentage of patients aged 18 and over, with GP recorded CVD (narrow definition), in whom the most recent blood cholesterol level (measured in the preceding 12 months) is non-HDL cholesterol less than 2.5mmol/l or LDL-cholesterol less than 1.8mmol/l.

For the remainder of the report, we will be using their indicator titles (and not definitions) as follows:

- **CVDP009CHOL**- cholesterol: CVD treated with LLT.
- **CVDP007CHOL**- cholesterol: CVD treated to threshold.

This report aims to provide explore these inequalities further. We used the December 2023 extract of the CVDPREVENT dataset and 2023 Office for National Statistics (ONS) local area deprivation estimates, for all the analyses in this report.

WHAT WE KNOW FROM THE EXISTING CVDPREVENT DATA

We know from the existing CVDPREVENT data that females were less likely to have an LLT prescription and even when they do were also less likely to achieve target cholesterol levels. Table 1 shows that there is an absolute difference of eight percentage points for CVDP009CHOL, and almost nine percentage points for CVDP007CHOL.

Figures 1 and 2 show that these inequalities are present almost across all age groups, except those aged 18 to 39 in figure 2 where there isn't any significant difference between males and females.

Table 1: Cholesterol management for patients with CVD, by sex

Existing CVDPREVENT Indicators:	Males (%) December 2023	Females (%) December 2023
CVDP009CHOL- cholesterol: CVD treated with LLT	86.2	78.2
CVDP007CHOL- cholesterol: CVD treated to threshold	36.9	28.1

Figure 1: CVDP009CHOL- cholesterol: CVD treated with LLT, by sex and age

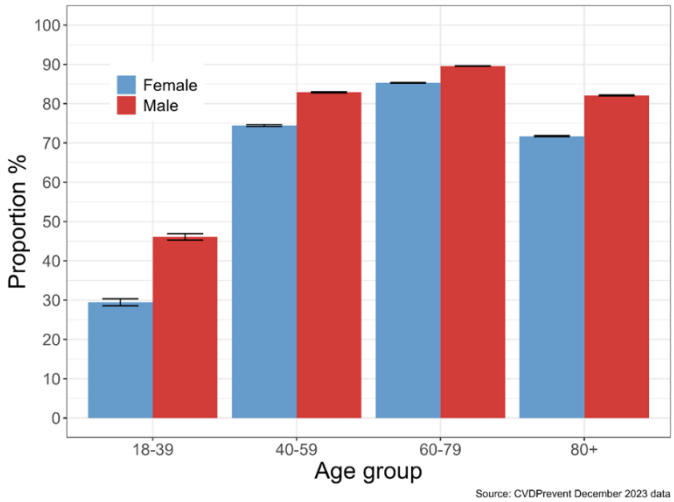
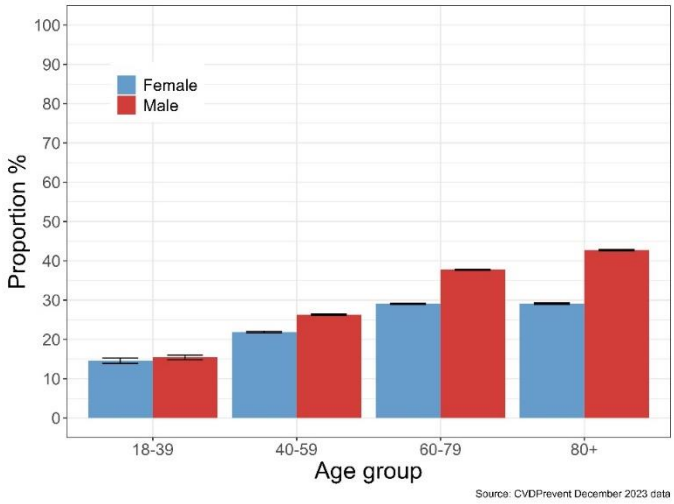


Figure 2: CVDP007CHOL- cholesterol: CVD treated to threshold, by sex and age



In order to examine the scale of the issue and better understand these inequalities, we asked four questions.

QUESTION 1: Are the inequalities present among all ethnic groups and levels of deprivation?

We looked at patients' ethnicity and deprivation data to check whether the inequalities between males and females vary between different ethnic groups and/ or deprivation quintiles.

We found that, in England, among patients with CVD, females were less likely than males to have a recent prescription for a lipid lowering therapy, and also less likely to achieve target cholesterol levels, across all ethnic groups and all deprivation quintiles (see tables 2 and 3). The differences between males and females were highest in the least deprived quintiles for both these indicators. Moreover, there was almost a six-percentage point difference between the most and the least deprived quintiles, in females who were treated with LLTs (CVDP009CHOL). For males, there was very little change between the two quintiles.

Table 2: Proportion of patients with CVD who have a recent LLT prescription by sex

CVDP009CHOL-cholesterol: CVD treated with LLT	Breakdown	Males	Females	Absolute difference (Males-Females)
Deprivation Quintile	1 - Most deprived	86.76	81.81	4.95
	2	86.15	78.97	7.18
	3	85.83	77.41	8.42
	4	86.10	76.62	9.48
	5 - Least deprived	86.34	76.10	10.24
Ethnicity	Asian	89.42	85.06	4.36
	Black	78.96	73.46	5.50
	Mixed	82.33	74.40	7.93
	Not stated	82.09	72.14	9.95
	Other	84.57	78.46	6.11
	White	86.49	78.44	8.05

Table 3: Proportion of patients with CVD who have achieved target cholesterol levels, by sex

CVDP007CHOL-cholesterol: CVD treated to threshold	Breakdown	Males	Females	Absolute difference (Males-Females)
Deprivation Quintile	1 - Most deprived	34.75	27.55	7.20
	2	36.24	27.89	8.35
	3	37.16	28.19	8.97
	4	38.05	28.41	9.64
	5 - Least deprived	38.58	28.51	10.07
Ethnicity	Asian	41.59	35.11	6.48
	Black	33.70	26.82	6.88
	Mixed	32.57	26.73	5.84
	Not stated	32.21	24.31	7.90
	Other	32.33	25.18	7.15
	White	37.01	27.93	9.08

QUESTION 2: Do these inequalities exist over the complete histories of LLT prescriptions or is it just over the recent six-month period?

The published indicator on prescriptions for lipid lowering therapies only assesses whether a patient has had a prescription over a recent six-month period. We further looked at patients' prescribing histories to see whether these inequalities are present over a longer period of time.

The CVDPREVENT audit data includes both the first and most recent LLT prescription data, for all patients with CVD. It also includes records of LLT being declined by the patient. Using these data, patients were categorised into the following groups:

- Patients with no LLT prescriptions
- Patients with at least one previous prescription, but no recent prescription
- Patients with a recent prescription (within the 6 months up to December 2023)

We found that, among patients with CVD, females were more likely than males to have never been prescribed an LLT (6% vs 4%) or been prescribed an LLT in the past, but not recently (14% vs 10%) (table 4). Therefore, females are less likely than males to have ever been prescribed LLT, but the inequality is narrower than for recent prescription.

Table 4: Number (Proportion) of patients with CVD with their LLT prescribing histories, by sex

	Never prescribed	Prescribed in the past but not recently
Males	56,949 (4%)	153,335 (10%)
Females	62,476 (6%)	141,976 (14%)

QUESTION 3: What do we know about overall variation in the distribution of cholesterol levels between males and females with CVD?

The existing CVDPREVENT indicator on cholesterol levels only tells us whether a patient has a cholesterol level below a certain threshold. The above question was introduced to test whether there were differences in the high cholesterol levels i.e. while females were more likely to have cholesterol levels above the target, males may be more likely to have very high cholesterol levels. To answer the above question, we looked at patients' most recent LDL and non- HDL cholesterol readings.

We used density plots for this exploration. A density plot is a smoothed version of the histogram that shows the distribution of all the data of interest. The curve represents the estimated proportion of all the patients in each range on the x-axis (in this case cholesterol value) rather than the frequency or count of patients, which could be too noisy to show clear patterns. This means that the height of the curve doesn't show how many times a patient appears but rather the proportion of all patients that falls into that range – this is referred to as the density. Density plots are useful for comparing two distributions of data (in this case males and females).

Figures 3 and 4 summarise the findings. We found that, among patients with CVD and a blood cholesterol test in the past year, males and females showed similar distributions of results, except that

the results among females were generally skewed towards higher readings. The proportion of all patients with readings above threshold was higher for females than males, for both non-HDL and LDL.

Figure 3: Density of latest LDL blood cholesterol readings among patients with GP recorded CVD and a blood cholesterol reading in the last 12 months

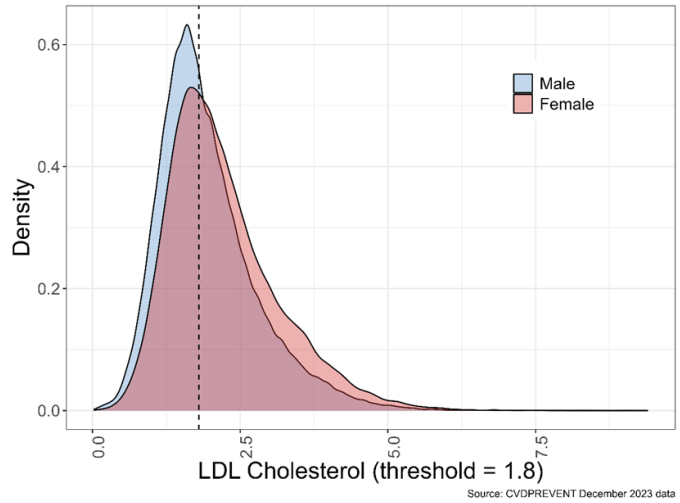
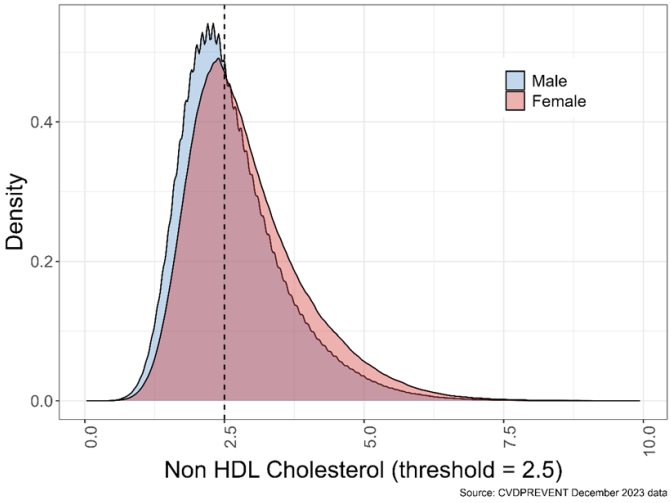


Figure 4: Density of latest non-HDL blood cholesterol readings among patients with GP recorded CVD and a blood cholesterol reading in the last 12 month



QUESTION 4: Are females with CVD and no recent LLT prescription less likely to achieve target cholesterol levels than females with CVD and a recent LLT prescription?

This question was introduced to check if there is any relationship between the two existing CVDPREVENT indicators around prescribing and achieving target cholesterol levels. In other words, it was included to test whether patients who choose not to receive LLT prescriptions may be managing their cholesterol in other ways, such as through their diet.

Table 4 below shows that 34% of females with CVD who had a cholesterol test in the past 12 months and a recent LLT prescription, achieved target cholesterol levels. This proportion dropped down to 5.4% for females with CVD, a cholesterol test and no LLT prescription. The equivalent proportions for males

were 42% and 8.1% respectively. This was also reflected in the histograms of non-HDL and LDL cholesterol results (figure 5 and figure 6). Among females without a recent LLT prescription the histogram peaked dramatically further to the right than those of females with a recent LLT prescription. The abovementioned percentages (5.4% and 34%) reflect the proportion of each histogram to the left of the thresholds. Around 200,000 females with CVD had a record of high cholesterol and no recent LLT prescription.

Thus, these findings suggest that a considerable number of females (and males) with CVD and no recent LLT prescription appear to have high cholesterol levels and could potentially benefit from such a prescription.

Table 5: Female patients with GP recorded CVD and a cholesterol test in the previous year

		Patient has a recent LLT prescription	
		Yes	***No***
Patient has achieved target cholesterol levels	***Yes***	271,416	11,831
	No	517,432	207,306
Proportion of patients who have achieved target cholesterol levels, with and without a recent LLT prescription		34%	5.4%

Figure 5: Comparing the distribution of latest LDL blood cholesterol readings in females with and without a recent LLT prescription

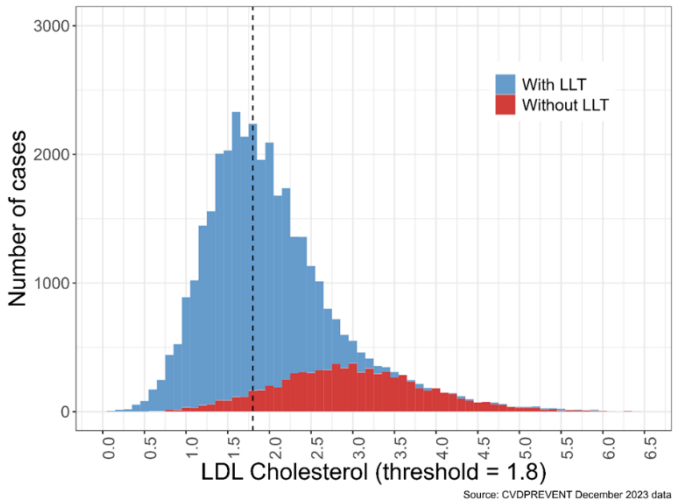
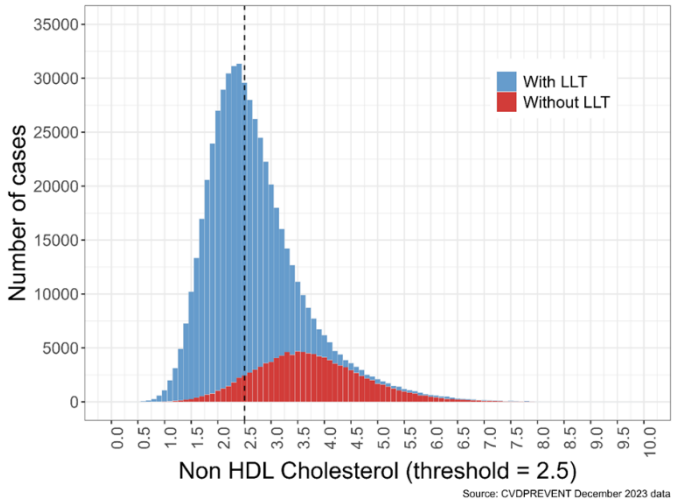


Figure 6: Comparing the distribution of latest non- HDL blood cholesterol readings in females with and without a recent LLT prescription



CONCLUSION

This report highlights that there are inequalities around cholesterol management by sex, across all ethnicities and deprivation quintiles. Females with a recent LLT prescription were much more likely to have achieved target cholesterol levels than females with no recent LLT prescription. The proportion of all patients with readings above threshold was higher for females than males, for both non-HDL and LDL readings. There were about 200,000 females with CVD who had a record of high cholesterol and no recent LLT prescription.

Overall, further work is needed to investigate the reasons behind these inequalities.

LIMITATIONS

We have only looked at CVDPREVENT data and hence, the analyses were limited to what is recorded in, and extracted from, primary care data. In addition, with prescribing, we can only know whether a particular drug (LLT in this case) was prescribed or not. We cannot infer from the data on the compliance of these prescriptions. Further methodology details and limitations of the CVDPREVENT dataset can be accessed via the methodology annex on the CVDPREVENT tool.

GLOSSARY

LLT	Lipid Lowering Therapy
LDL	Low Density Lipoprotein
HDL	High Density Lipoprotein
CVD	Cardiovascular disease
NICE	National Institute of Health and Care Excellence

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