

Inequalities by gender and overall Index of Multiple Deprivation (IMD) in accessing Aortic Valve Replacement remain remarkable in England.

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Objective

To extend and include a post-pandemic population to Rice et al¹'s analysis on gender and deprivation-based differences in provision of aortic valve replacement (AVR) in England for adults with aortic stenosis (AS).

Methods

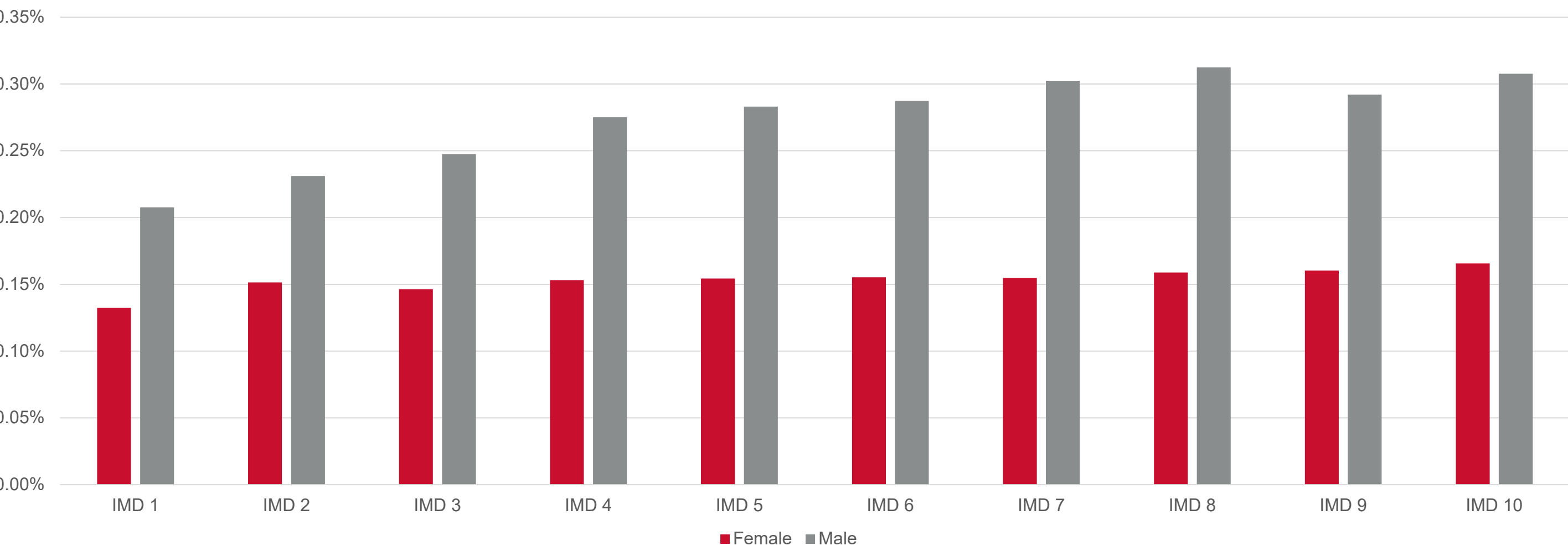
- We retrospectively identified adults with a primary diagnosis of AS from the English Hospital Episode Statistics (HES) between April 2019 and February 2024 and those who subsequently had an AVR on index. People were eligible for the HES-AS cohort if they had an ICD-10 diagnostic code for AS (I350, I352, including rheumatic AS codes I060 and I062) recorded during an inpatient hospital admission. For the HES-AVR cohort, we included adults who underwent AVR using OPCS-4 codes K262, K263 and K264.
- The results were compared with general population data from 2020 to address imbalances in gender and the Index of Multiple Deprivation (IMD). This general population data was sourced from the 2021 Census².
- Only patients with age ≥ 65 were included in the analysis.
- Statistical analysis: The odds ratio (OR) for receiving AVR was estimated using logistic regression. An analysis was done with gender and Index of Multiple Deprivation (IMD)[#] as explanatory variables. Separate analyses were conducted for females and males using IMD as an explanatory variable. Patients with unknown or unstated gender or IMD were excluded from the analysis. No imputation was performed. For gender, females were compared to males to obtain the OR. For IMD, each IMD category was compared to the least deprived decile. All analyses were performed using R version 4.3.3³.

Table 1: Demographics summary

Metrics	England Total cohort	HES AVR cohort
Number of people/patients (age≥65)	10 464 019	22 577
Gender, N(%) [§]		
Male	4 791 463 (45.79%)	13 460 (59.62%)
Female	5 672 556 (54.21%)	8 790 (38.93%)
Unknown	-	327 (1.45%)
IMD decile distribution, N (%) [§]		
IMD 1 (Most Deprived)	727 626 (6.95%)	1 222 (5.41%)
IMD 2	786 312 (7.51%)	1 485 (6.58 %)
IMD 3	861 720 (8.24%)	1 675 (7.42%)
IMD 4	980 819 (9.37%)	2 065 (9.15%)
IMD 5	1 074 263 (10.27%)	2 315 (10.25%)
IMD 6	1 149 084 (10.58%)	2 505 (11.10%)
IMD 7	1 190 163 (11.37%)	2 685 (11.89%)
IMD 8	1 216 551 (11.63%)	2 830 (12.53%)
IMD 9	1 232 462 (11.78%)	2 775 (12.29%)
IMD 10 (Least Deprived)	1 245 019 (11.90%)	2 970 (13.15%)
Unknown	-	50 (0.22%)

[§]Percentage of the cohort

Figure 1: AVR by Gender and IMD



[#]The Index of Multiple Deprivation (IMD) is a unique measure of relative deprivation at a small local area level across England. Deciles are calculated by ranking the 32,844 small areas in England, from most deprived to least deprived, and dividing them into 10 equal groups. These range from the most deprived small areas nationally (IMD 1) to the least deprived small areas nationally (IMD 10)⁴.

Conclusion

- Women and individuals from more deprived backgrounds have lower odds of receiving AVR compared to men and those in the least deprived decile.
- The Index of Multiple Deprivation (IMD) has a greater influence on AVR treatment in men than in women.
- These findings align with the results published by Rice et al.¹ for the period 2016-2019.
- Differences in AVR treatment in England persist based on gender and deprivation index.

Results

- 55 305 adults with primary diagnosis of AS were identified; of these, 26 910 underwent AVR and 22 577 patients were ≥ 65 years old. 59.62% were male, 38.93% female, in comparison with 45.79% and 54.21% respectively in the general population. (Table 1)
- Women were significantly less likely to receive AVR than men (OR 0.55; 95% CI 0.54-0.57; p-value < 0.001). (Table 2)
- People from the least deprived areas were more likely to receive AVR compared to those from the most deprived decile (OR 0.72; 95% CI 0.68-0.77; p-value < 0.001). For men, the OR for the most deprived decile compared to the least deprived decile was 0.67 (95% CI 0.62-0.74; p-value < 0.001), while for women, the OR was 0.80 (95% CI 0.72-0.89; p-value < 0.001). (Figures 2-5)

Table 2: Odds of receiving AVR for gender (adjusted to IMD)

	Total (N)	AVR Cohort (N)	AVR % from Total	OR (95%CI)	P-value	
Male	4 791 463	13 460	0.28%			
Female	5 672 556	8 790	0.15%	0.55 (0.54-0.57)	< 0.001	***

Figure 2: Odds of receiving AVR adjusted for gender and IMD (p-value)

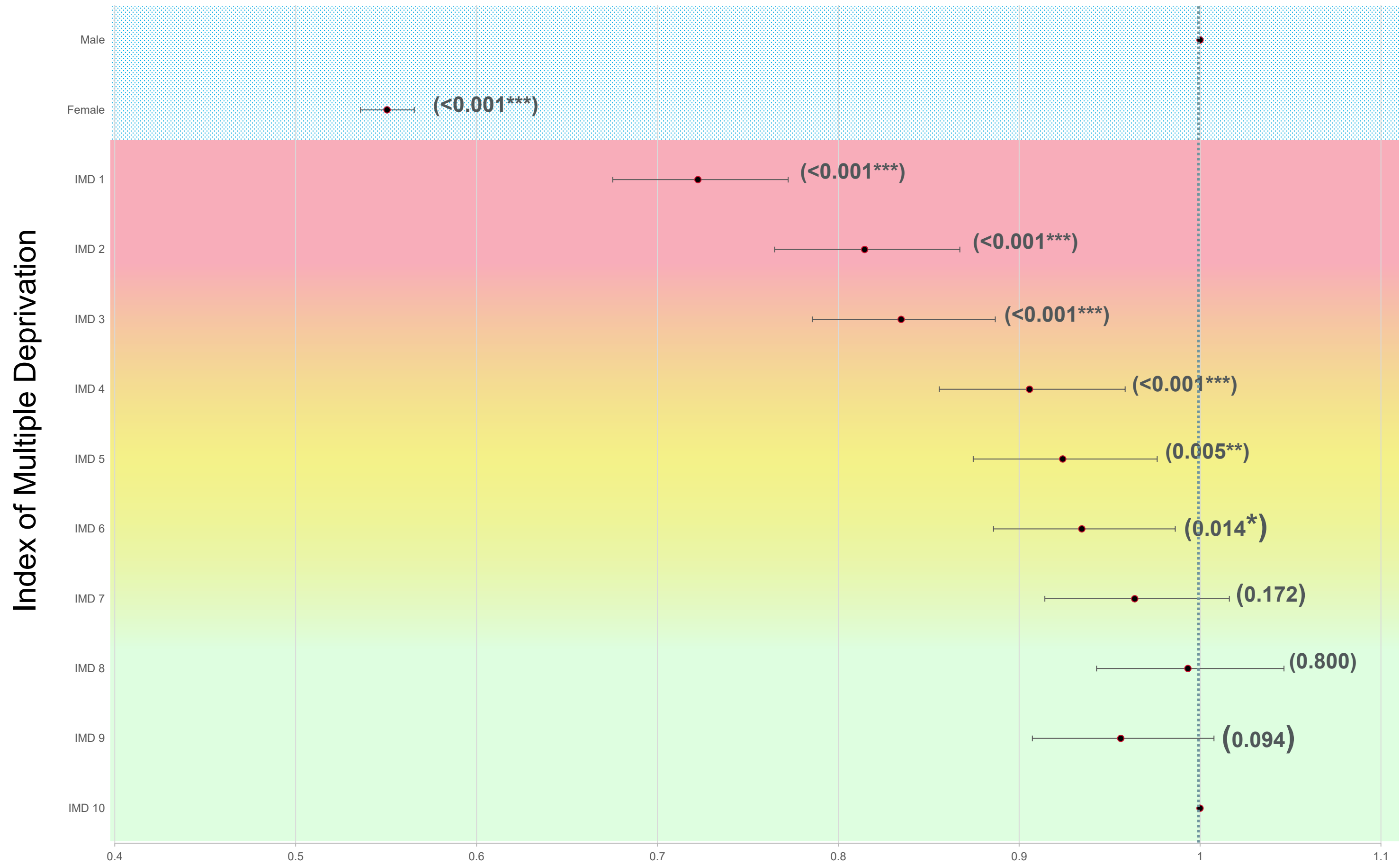


Figure 3: Odds of receiving AVR by IMD for Female (p-value)

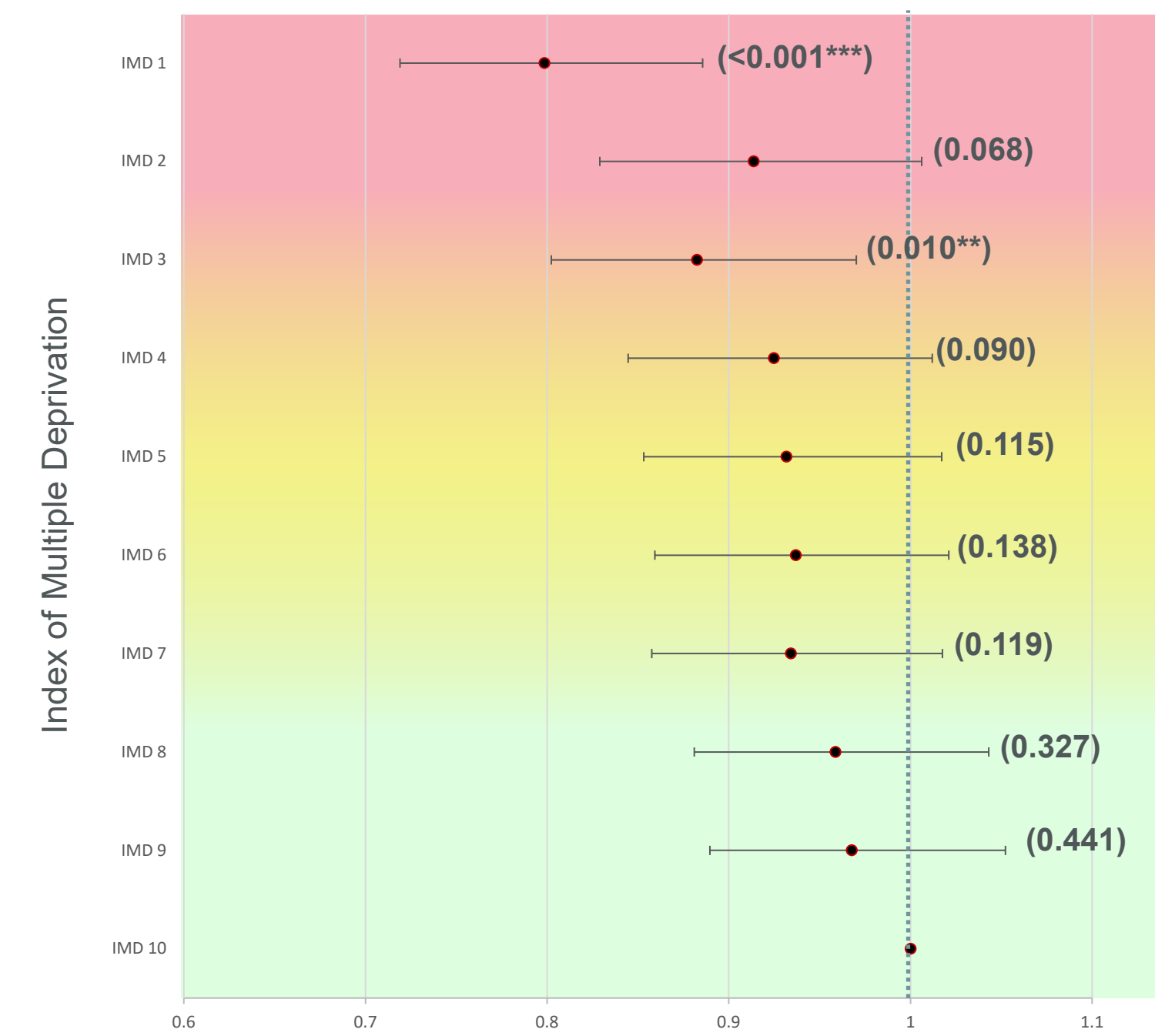
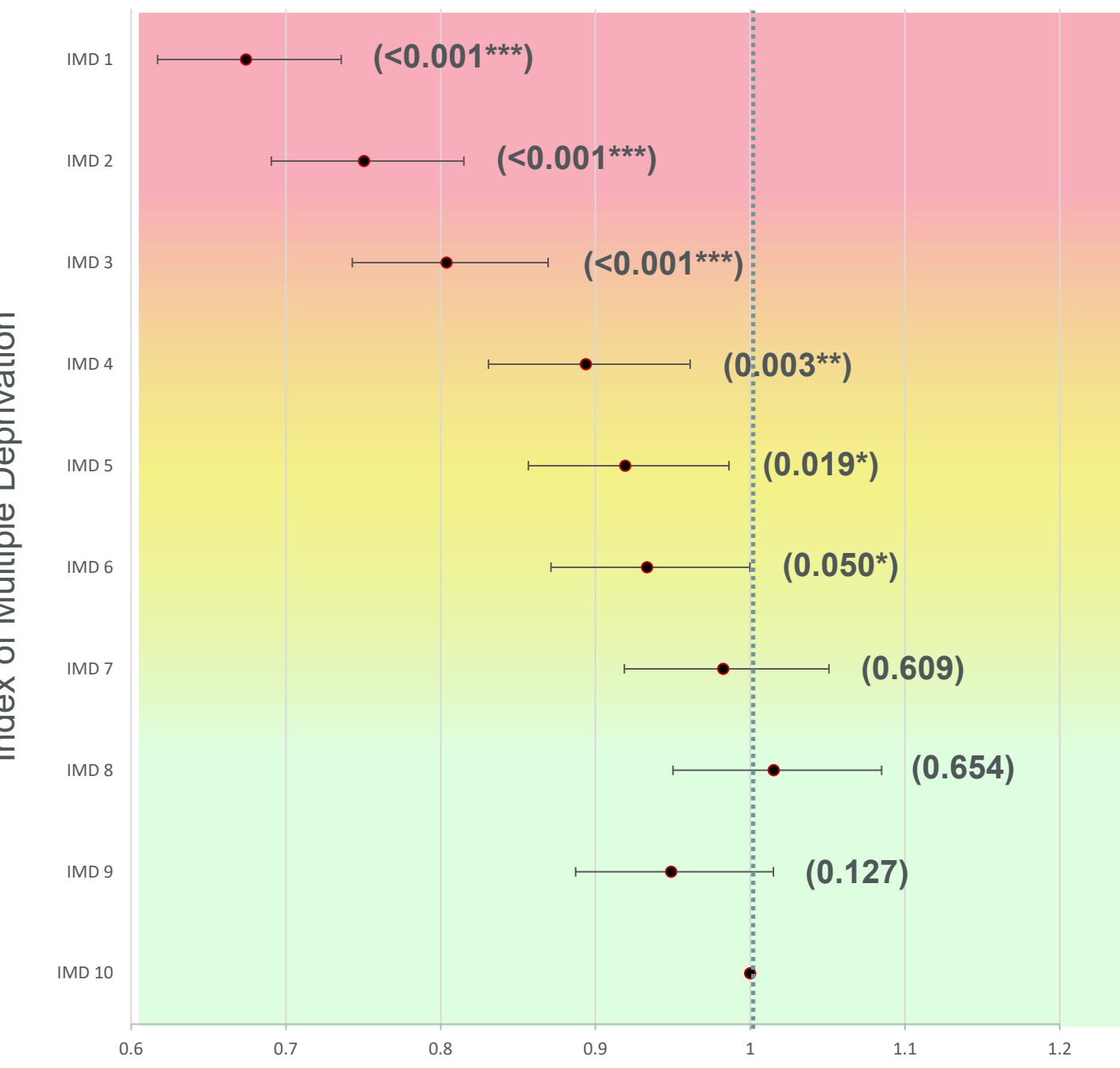


Figure 4: Odds of receiving AVR by IMD for Male (p-value)



* p-value < 0.05, ** p-value < 0.01, *** p-value < 0.001



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1) Rice, C. T., et al.(2023). Open heart, 10(2), e002373. <https://doi.org/10.1136/openhrt-2023-002373>
2) <https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/adhocs/13773populationsbyindexofmultipledeprivationimddecileenglandandwales2020>. Downloaded May 13, 2024.
3) R Core Team (2024): _R: A Language and Environment for Statistical Computing_. R Foundation for Statistical Computing, Vienna, Austria. <<https://www.R-project.org/>>.
4) Ministry of Housing, Communities & Local Government The English Indices of Deprivation 2019 Frequently Asked Questions (FAQs) https://assets.publishing.service.gov.uk/media/5dfb3d7ce5274a3432700cf3/loD2019_FAQ_v4.pdf. Downloaded October 18 2024.