without FFA, the percent of patient samples having less than 4% FF varied by ethnicity; 6.36% for samples from patients with African ancestry (N=27,151 samples) to 2.42% in samples from patients with East Asian ancestry (N=8,039 samples; Figure 2).

- With FFA, the percentage ≤4% FF fell to less than 1% across all ethnic groups (Figure 2).

- Further, patients with high BMI benefited from the incorporation of FFA.

- Without FFA, 12.95% of samples from patients with obesity (obesity classes I-III) (N=88,415) had fetal fractions <4%. Low FF was most pronounced in patients with class III obesity (21.15%), followed by class II obesity (12.43%) and class I obesity (6.89%; Figure 3).

- With FFA, only 0.28% of samples from patients with obesity (obesity classes I-III; N=81,027) had FF ≤4%, greatly reducing the chance of test failure. Notably, FFA increased FF effectively even in patients with class III obesity, with only 0.66% of these patients experiencing a test failure after FFA was implemented (Figure 3).

These results indicate that NIPS with FFA improves disparate FF distributions, thereby providing more equitable risk assessment regardless of patient ethnicity and supporting weight-neutral clinical care.