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In 1996, Rudnick and Sarnak computed n -correlation of the zeros of the Riemann zeta function when the Fourier transform $\hat{f}(u_1, \dots, u_n)$ of a test function f is supported in the region $\sum_{j=1}^n |u_j| < 2$. The restriction of the support of the Fourier transform of f is required so that the contribution from the off diagonal terms can be ignored. However, a good conjecture for n -correlation for arbitrary support is available through random matrix theory. Using a technique from Conrey, Iwaniec and Soundararajan's work on asymptotic large sieve, we will investigate the n -level density of low lying zeros of primitive Dirichlet L -functions in the case that the Fourier transform $\hat{f}(u_1, \dots, u_n)$ of a test function f is supported in the region $\sum_{j=1}^n |u_j| < 4$. This is the first time for unitary ensemble that the n -correlation conjecture is verified for a wider range, where off-diagonal terms start contributing. (Received September 20, 2018)