A survey was conducted in a slum locality of 2000 families by selecting a sample of size $n = 800$. It was revealed that 180 families were illiterates. Find the probable limits of the illiterate families in the population of $N = 2000$.

Solution

The level of significance is not given. Then we can use 3σ-limits. Hence, the probable limits for the proportion in the population are:

$$p \pm 3\sigma = p \pm 3\sqrt{\frac{pq}{n}}.$$

The probable limits of the illiterate families in the population of $N = 2000$ are

$$N\left(p \pm 3\sqrt{\frac{pq}{n}}\right) = 2000\left(\frac{180}{800} \pm 3\sqrt{\frac{\frac{180}{800}\left(1 - \frac{180}{800}\right)}{800}}\right) = 2000(0.225 \pm 3 \cdot 0.015) = 2000(0.225 \pm 0.045)$$

$$= (360; 540).$$

Answer: $(\mathbf{360}; \mathbf{540})$.