🎙️ Presentation Script & Explanations

Slide 1 – Title: “Sampling Funnel & Inferential Statistics”

Introduce yourself and explain that today you’ll discuss the key inferential tools used in data analytics. Highlight that you’ll start from how samples are drawn (the sampling funnel) and progress to statistical inference methods such as the central limit theorem (CLT) and confidence intervals. Emphasise the importance of understanding sampling variation when making business or scientific decisions.

Slide 2 – Agenda

Walk the audience through the four main sections: (1) a brief overview of sampling and the sampling funnel; (2) the central limit theorem, which underpins most inferential procedures; (3) confidence intervals to quantify uncertainty; and (4) a summary of sampling variation and practical takeaways. This slide sets expectations and prepares listeners for the narrative flow.

Slide 3 – Sampling Funnel

Use the funnel graphic to explain the narrowing process from population to sample. Start with defining the population and study objectives, then discuss constructing a sampling frame. Explain common probability sampling methods—simple random, stratified and cluster—and stress that each “filter” must preserve representativeness. Conclude by noting that an adequate sample size helps ensure reliable inference and reduces sampling error.

Slide 4 – Central Limit Theorem

Describe the CLT: regardless of the underlying population distribution, the distribution of the sample mean approaches normality as sample size grows. Point at the line chart to visualise how sampling distributions converge to a bell shape. Emphasise that the CLT allows us to compute probabilities and conduct hypothesis tests even when data are skewed. Note the formula for the standardized statistic $Z=n(X^{-}–μ)/σZ = \sqrt{n}(\bar{X} – \mu)/\sigma$ and mention that $n≥30n ≥ 30$ is a common rule of thumb.

Slide 5 – Confidence Intervals

Define a confidence interval (CI) as a range of plausible values for an unknown parameter. Explain the elements of the formula X¯±zα/2(S/n)\bar{X} \pm z_{\alpha/2}(S/\sqrt{n}) and stress that CIs depend on sample size, variability and chosen confidence level. Use the bell-curve image to illustrate the interval as a shaded region under a distribution. Clarify that a 95 % CI does not mean there is a 95 % chance the specific interval contains the true mean; rather, it reflects the long-run reliability of the method.

Slide 6 – Sampling Variation & Conclusions

Summarise sampling error as the gap between a sample statistic and the population parameter. Explain that random variation means two samples rarely yield identical results, but increasing the sample size or using stratified designs reduces error. Remind the audience that CLT and CIs explicitly account for sampling variation and allow us to make probabilistic statements about the population. Conclude with practical advice: design a representative funnel, ensure adequate sample size, apply CLT carefully and always report confidence intervals to communicate uncertainty.

These materials should equip you with a thorough understanding of the topic and provide a professional presentation ready to deliver. Let me know if you need anything else!