

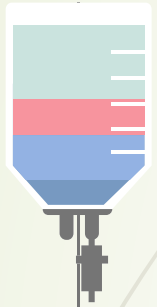
CREATING A NIGERIAN POPULATION  
FREQUENCY DATABASE OF AUTOSOMAL  
STR LOCI FOR FORENSIC APPLICATIONS

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# What are Autosomal STR Loci?

- **Autosomal:** Not a sex chromosome.
  - 22 pairs of autosomes
  - 1 pair of sex chromosome (XX or XY)
- **STR:** Short Tandem Repeats
  - Repeated sequence of DNA (2-6 bp)
  - For example, TGAA
- **Loci:** Non-coding locations on chromosomes
  - Used to establish identity of individuals
  - Not predictive of phenotype or diseases
- **Alleles:** Number of STR repeats
  - Variable among individuals

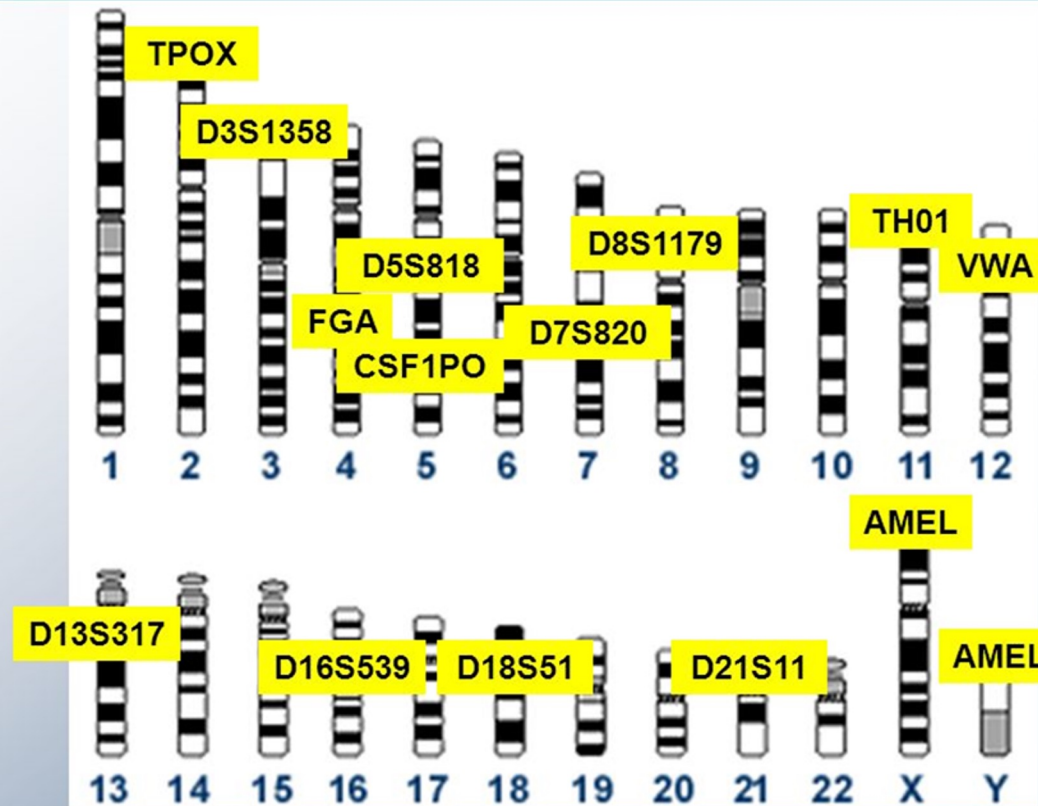


# Brief History of STR Loci

- **First STR loci** were selected by Forensic Science Services (1994)
  - 4 tetranucleotide STRs- TH01, vWA, FES/FPS and F13A1
  - Low discriminatory power
- **13 core CODIS loci** by the FBI (1997)
  - TH01, vWA, CSF1PO, FGA, TPOX, D3S1358, D5S818, D7S820, D8S1179, D13S317, D16S539, D18S51 and D21S11.
  - Markers selected due to no known association with physical or medical characteristics
- **Addition of 7 STR loci** to the CODIS set (2010)
  - D1S1656, D2S441, D2S1338, D10S1248, D12S391, D19S433, D22S1045
  - Implementation began January 1, 2017

# Brief History of STR Loci

## 13 CODIS Core STR Loci with Chromosomal Positions



# Need for Nigerian Frequency Database

A population frequency database has several uses:

➤ **Aids criminal investigations**

- Determines strength of evidence from crime scenes
- Rarer an allele in a population = stronger implication of a suspect that has it

➤ **Aids human identification**

- Missing persons and disaster victims identification

➤ **Determines likelihood of relationship in biological tests**

- Paternity, maternity, avuncular, grandparentage and sibship tests

➤ Due to a large number of available human populations, recommendation is use of database that matches ancestry of queried contributor.

➤ Statistical strength of DNA evidence is determined using relevant database

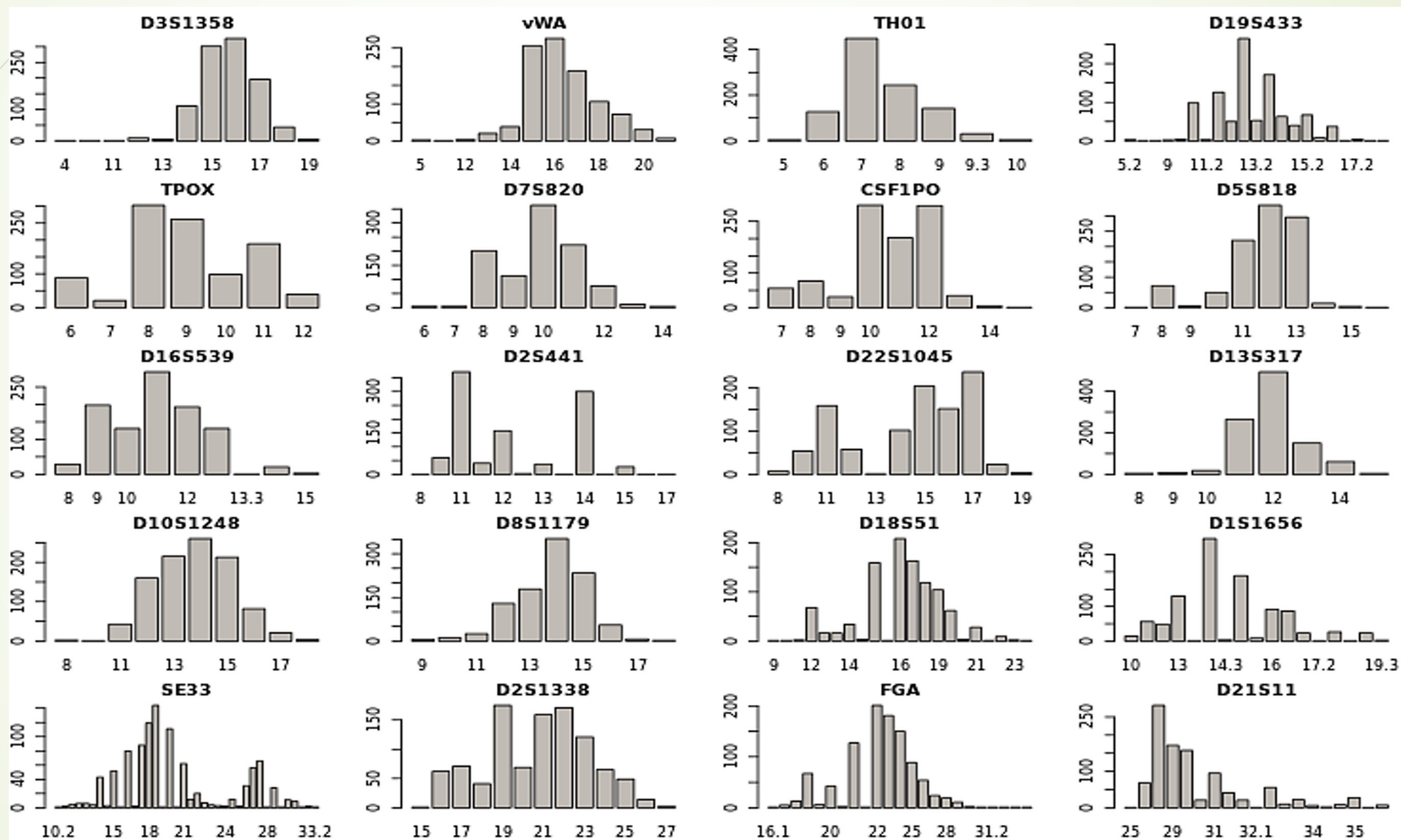
# Methodology Used at LSD&FC

- Buccal samples collected from 500 self-reported Nigerians
- Anonymized data used as aggregates
- Extraction and amplification of samples
- Analysis of amplified products using Capillary Electrophoresis method
- Allele calling and designation
- Calculation of allele frequencies and other forensic parameters using STRAF software

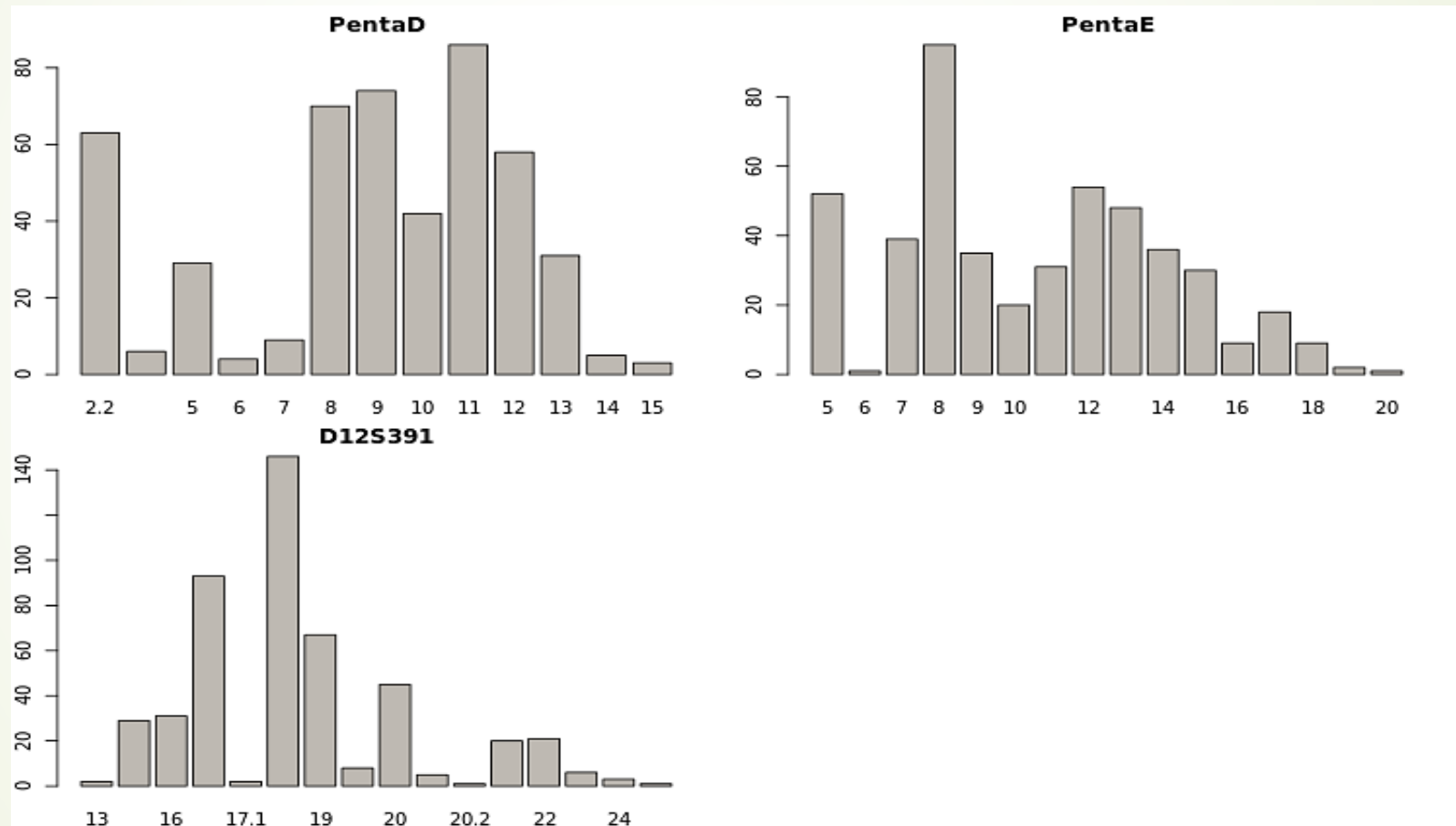
# Results from Study

- ▶ Loci tested are TH01, vWA, CSF1PO, FGA, TPOX, SE33, D1S1656, D2S441, D2S1338, D3S1358, D5S818, D7S820, D8S1179, D10S1248, D12S391, D13S317, D16S539, D18S51, D19S433, D21S11, D22S1045, Penta E and Penta D.
- ▶ Allele frequencies ranged from **0.001 to 0.493**
- ▶ All studied loci were shown to be **highly polymorphic**
- ▶ **No departures** from the Hardy-Weinberg equilibrium
- ▶ Loci showed **high discriminatory power**
- ▶ No **significant differences** in data from other African countries
- Kenya, Democratic Republic of Congo, Senegal, Namibia and Central African Republic

# Results from Study



# Results from Study



# QA/QC Measures Taken at LSD&FC

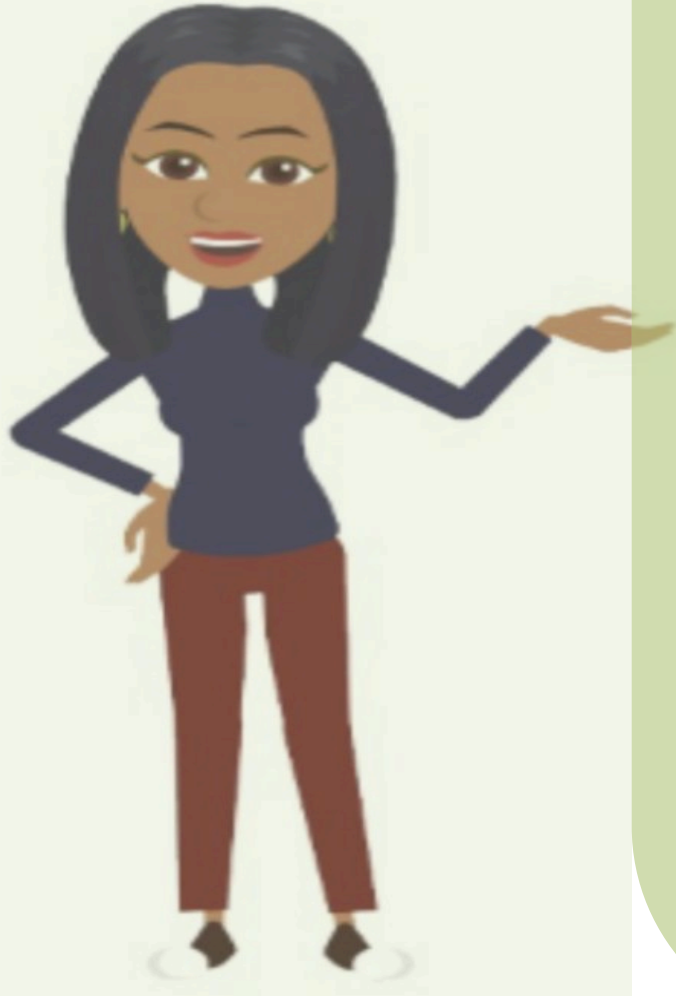
- ▶ All data were independently validated by two analysts
- ▶ STRAF software was first validated using mock data
- ▶ Adherence to other recommended International Society for Forensic Genetics (ISFG) guidelines.



**ISO/IEC 17025:2017**

*Accredited Laboratory*





## CONCLUSION

- Results from this study provide allele frequency information for the Nigerian population.
- This data can be applied to Nigerian forensic DNA analysis and human identification methods.

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**QUESTIONS?**





Thank You!!!

