The Standard Deviants - Group 1 EDAB Presentation

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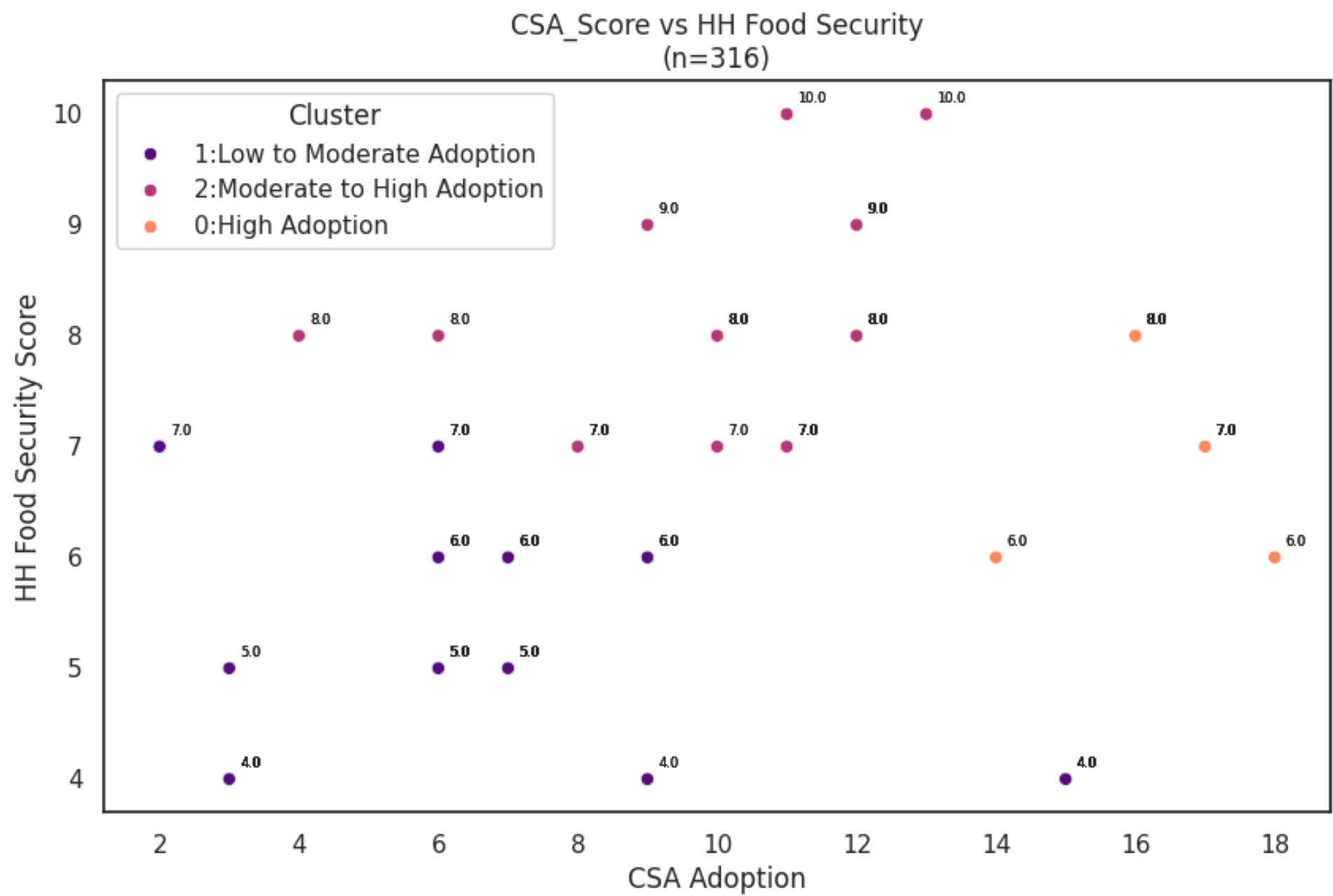Tsholofelo Motlhale - 2020619553

Introduction

Research Question

To what extent does the adoption of climate-smart agricultural (CSA) practices improve maize productivity and household food-nutrition security among smallholder farmers in North-West South Africa

- **Context**: Data collected from 316 smallholder farmers in North-West Province (2022–2023)
- **Source:** Omotayo et al. (2024) – Data in Brief article
- **Data Contents:** Demographics, CSA practices, yield, income, HDDS and HFIAS
- **Tools Used:** Google Colab for data cleaning, feature engineering, clustering and visualization.
- **Note:** Attempted to contact the author of the article for greater insight but received no response.
- **Interactive dashboard available via QR code**

Dashboard - Scan Me!

Impact of CSA on Maize Yield & Food Security In North West SA

CSA_Score vs HH Food Security
(n=316)

CSA_Score vs Maize Harvested (tons)
(n=316)

- Low CSA adoption score—>low HH Food Security Score

- Medium CSA adoption Score —>highest HH Food Security Score

- Uneven distribution means more factors affect HH food security & Maize productivity

- Extent of CSA adoption boosts but doesn't guarantee productivity& food security
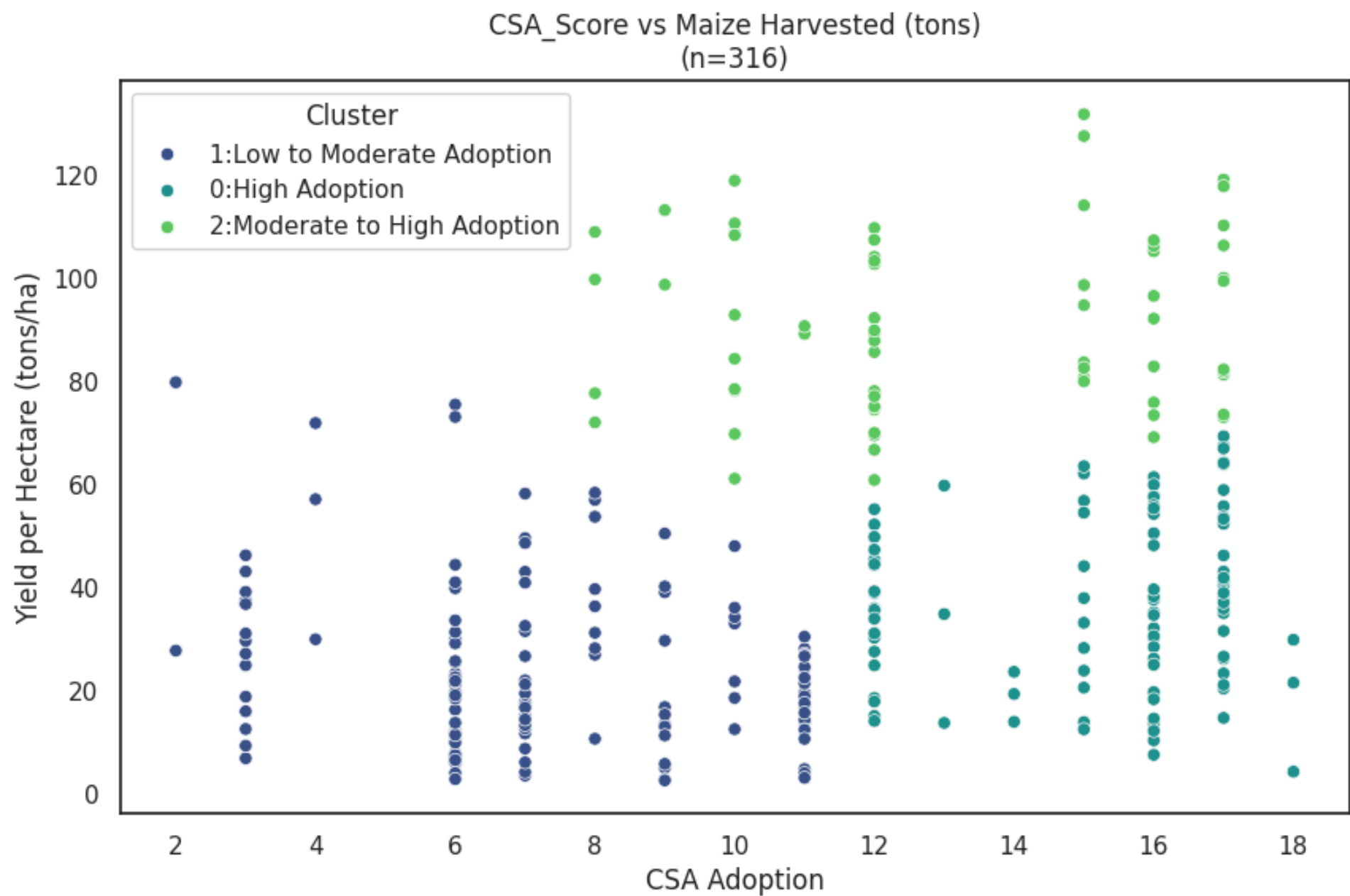
- Clustered farmers according to CSA score

- Low CSA adoption Score—>Low Maize yield per hectare

- Moderate CSA adoption Score—>Highest Maize yield per hectare

- Moderate to Higher CSA adoption score boosts maize productivity

CSA score vs. Maize Productivity: Does Higher Adoption Lead to Better Yields?

Intensity Of CSA Score Level Vs Its Maize Productivity
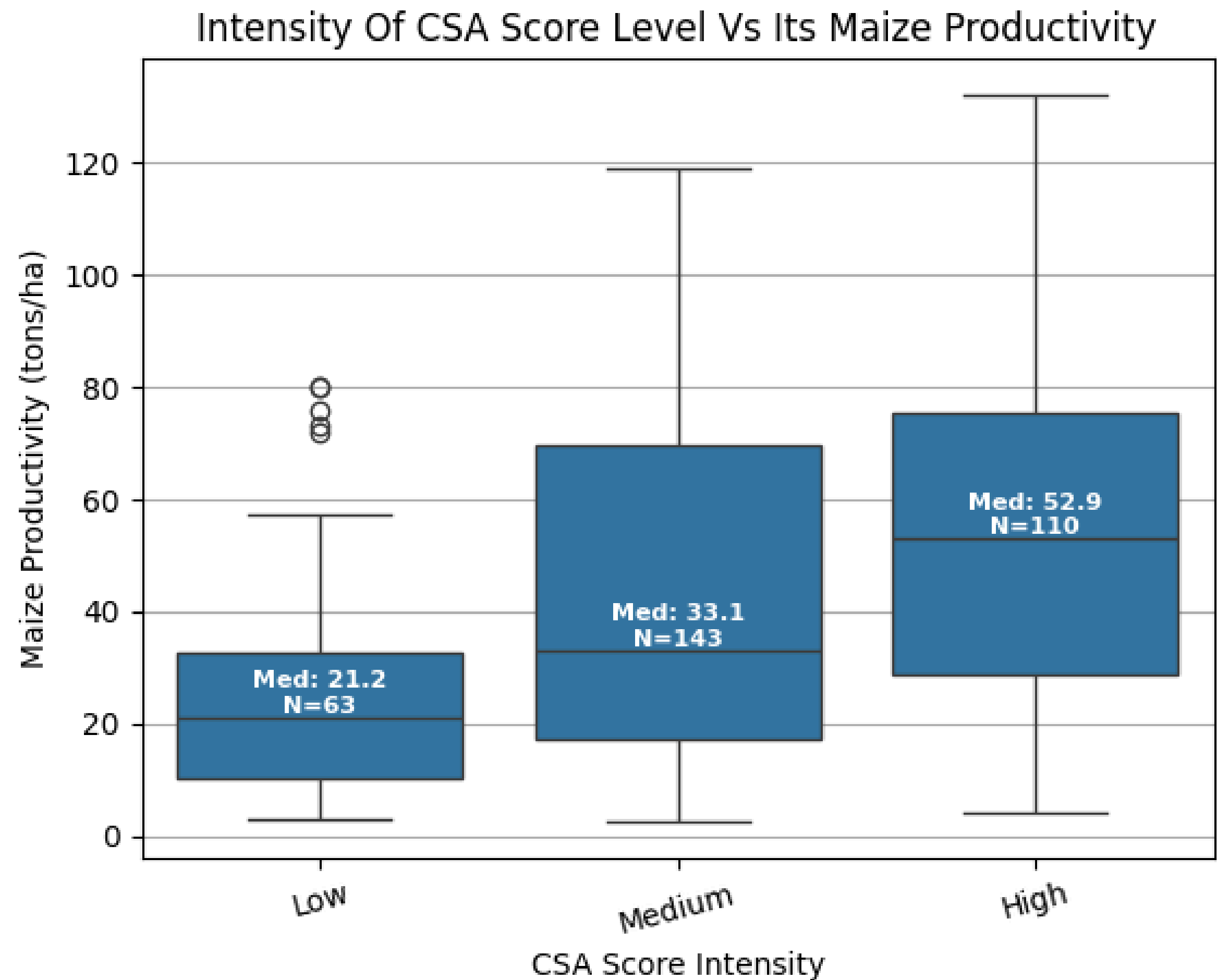
- ● Higher CSA adoption boosts yields, with median productivity rising from Low to High adoption levels.

- ●High adopters show top performance, including the highest yields and standout outliers.

- ● Medium group shows wide variability, indicating inconsistent results with partial adoption.

- ●Outliers in all groups suggest other factors like soil, water and experience affect yields.

- ●CSA isn't the only driver,productivity depends on both CSA and external conditions.

- ●Implementation quality matters, as variability at higher adoption levels reflects how practices are applied.

Impact of CSA Practices on total Maize Yield/Production

Total Maize Production by Different CSA Practices
(n=316)

CSA Adoption ■ Adopted ■ Not Adopted
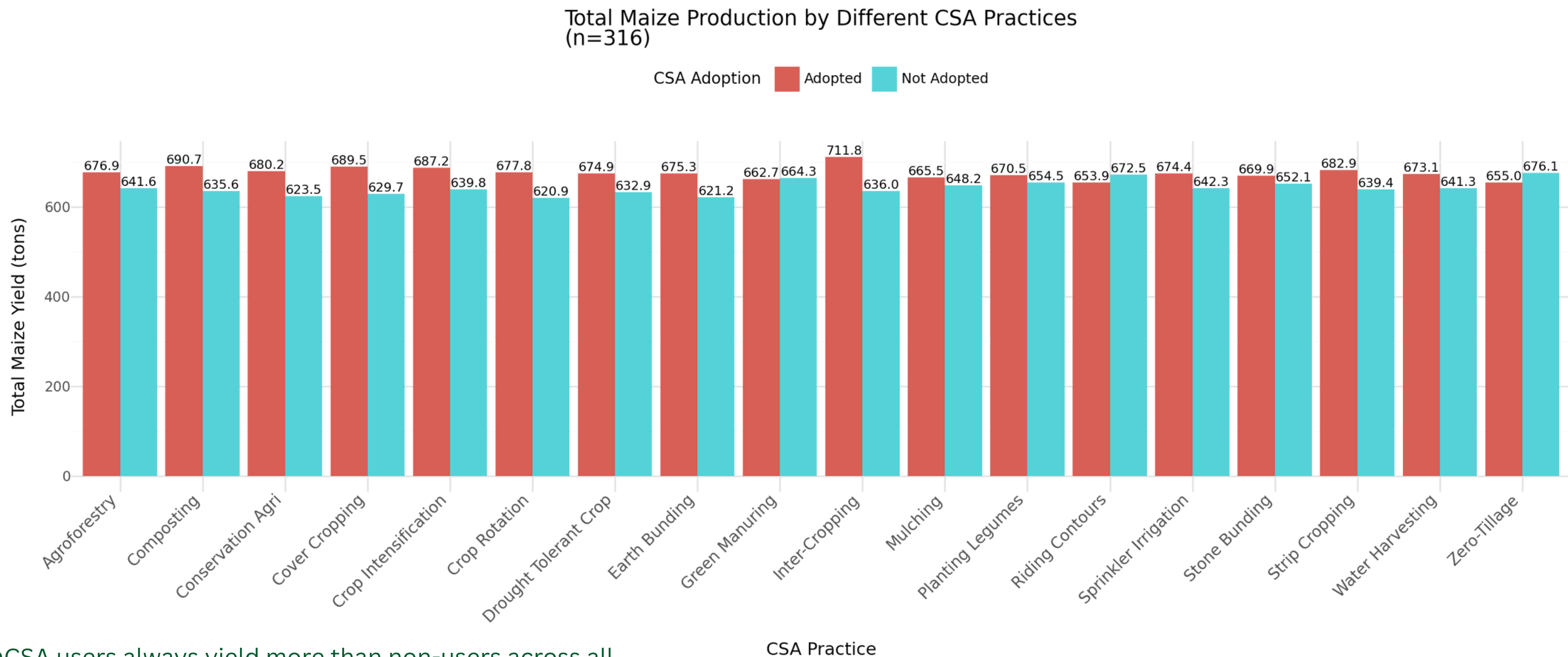
- CSA users always yield more than non-users across all practices.

- Inter-Cropping, Intensification, and Agroforestry show the biggest yield gains.

- Impact varies, suggesting some practices work better in certain conditions.
- All practices boost yields, showing CSA's overall effectiveness.

Limitations and Recommendations

Limitations

- Missing or dropped Variables.
- Limitation of farmers reported data bias.
- Geographic Limitation.
- Questionnaire access Limitation.
- Derived factors may vary(Binary Variables and Dataset Variables).

Recommendations

- Promote CSA among low adopters to reduce food insecurity and vulnerability.
- Address barriers for high adopters (e.g., water access, market limitations).
- Integrate CSA with complementary interventions like education and income diversification.
- Target moderate adopters with training to improve uptake and outcomes.
- Optimise practices for high adopters to stabilise yields and food security.
- Replicate effective strategies across regions by learning from successful clusters.

- Investigate variability causes to ensure consistent benefits.