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Adult numeracy within a lifelong learning metric : A case from Senegal in Action Research to measure literacy programme participants' learning outcomes (RAMAA)

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- Backgrounds : Adult numeracy in Sustainable Development Goals
- RAMAA : Action Research on Measuring Literacy Programme Participants' Learning Outcomes
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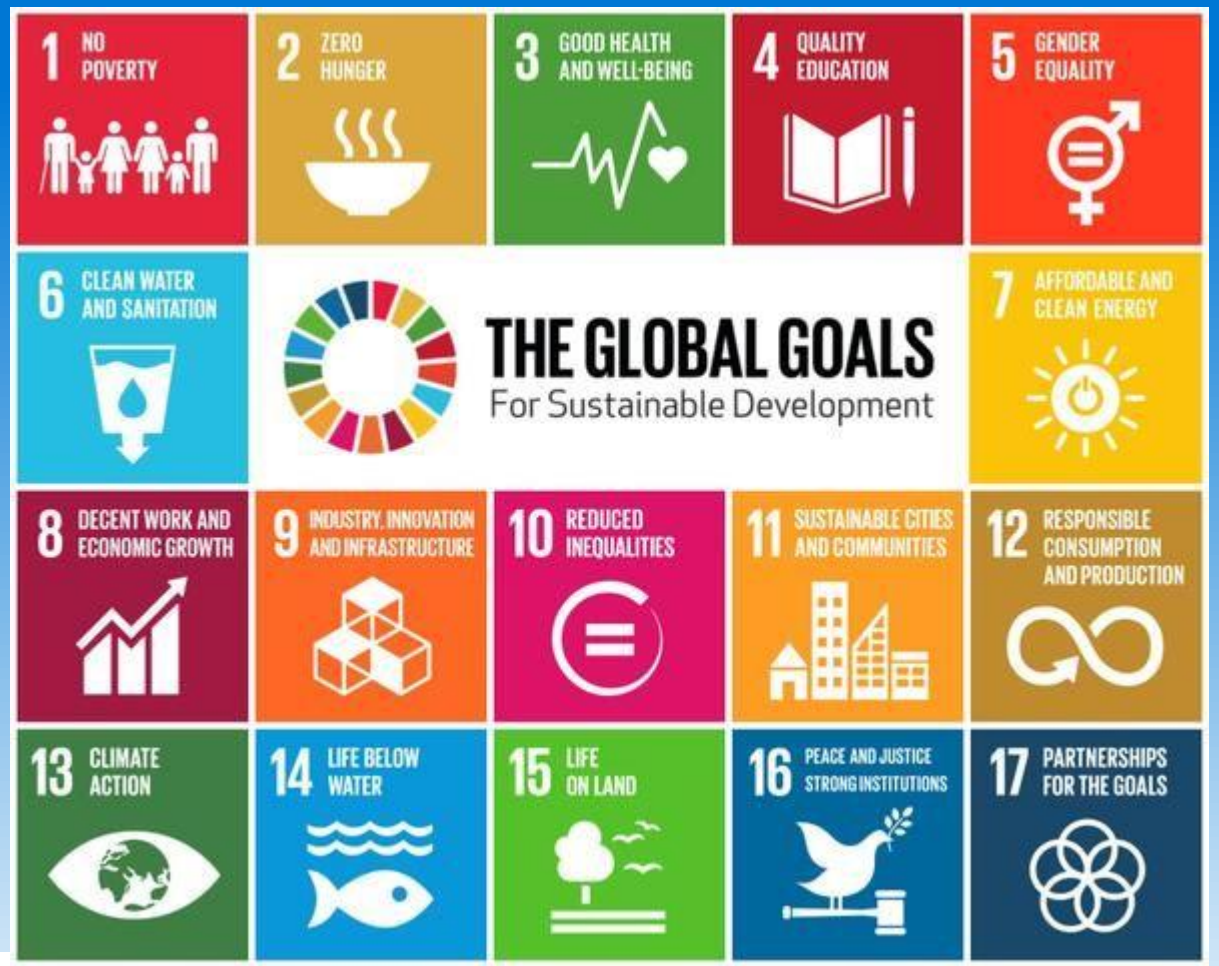
Lifelong learning in SDG 4



Education 2030

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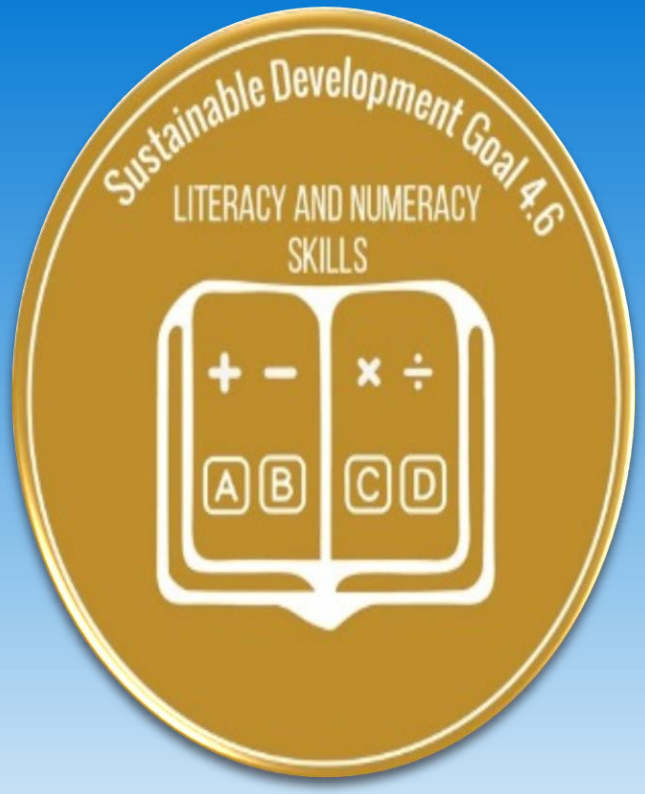
Literacy within the **Framework of Lifelong Learning**



SDG 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all

4.6 By 2030, ensure that all youth and a substantial proportion of adults, both men and women, achieve literacy and numeracy

% of youths/ adults who have achieved at least a minimum level of proficiency in literacy and numeracy skills

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Literacy within the **Framework of Lifelong Learning**

- We live in different life and livelihood contexts
- Literacy learning must be relevant in these diverse contexts

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RAMAA (Action Research: Measuring Literacy Programme Participants' Learning Outcomes)

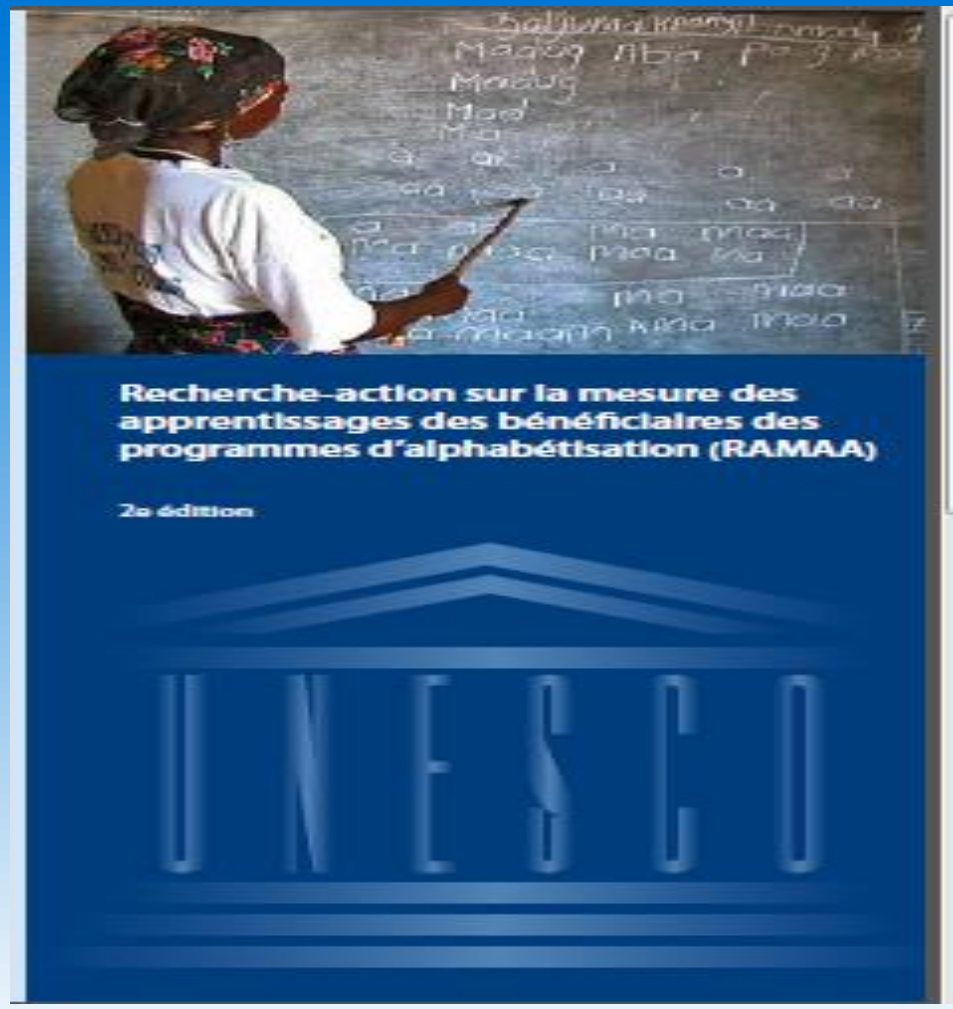
- **RAMAA is focusing on the evaluation of the quality of literacy programmes by measuring learning outcomes.**

- OBJECTIVES:

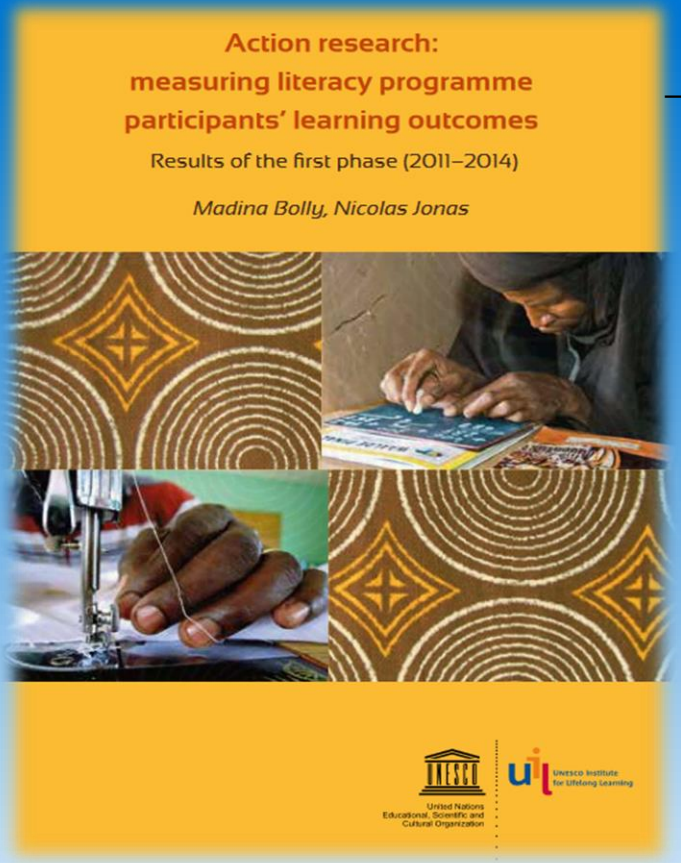
– provide national policymakers and development partners with reliable and contextualized data to be used to improve the quality of literacy programmes for youth and adults

– strengthen evidence-based advocacy for youth and adult literacy

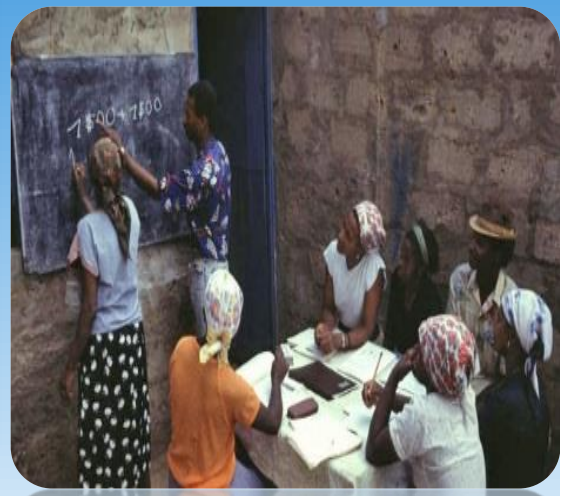
– strengthen national capacities through action research to develop monitoring and evaluation, with a focus on ownership and sustainability.

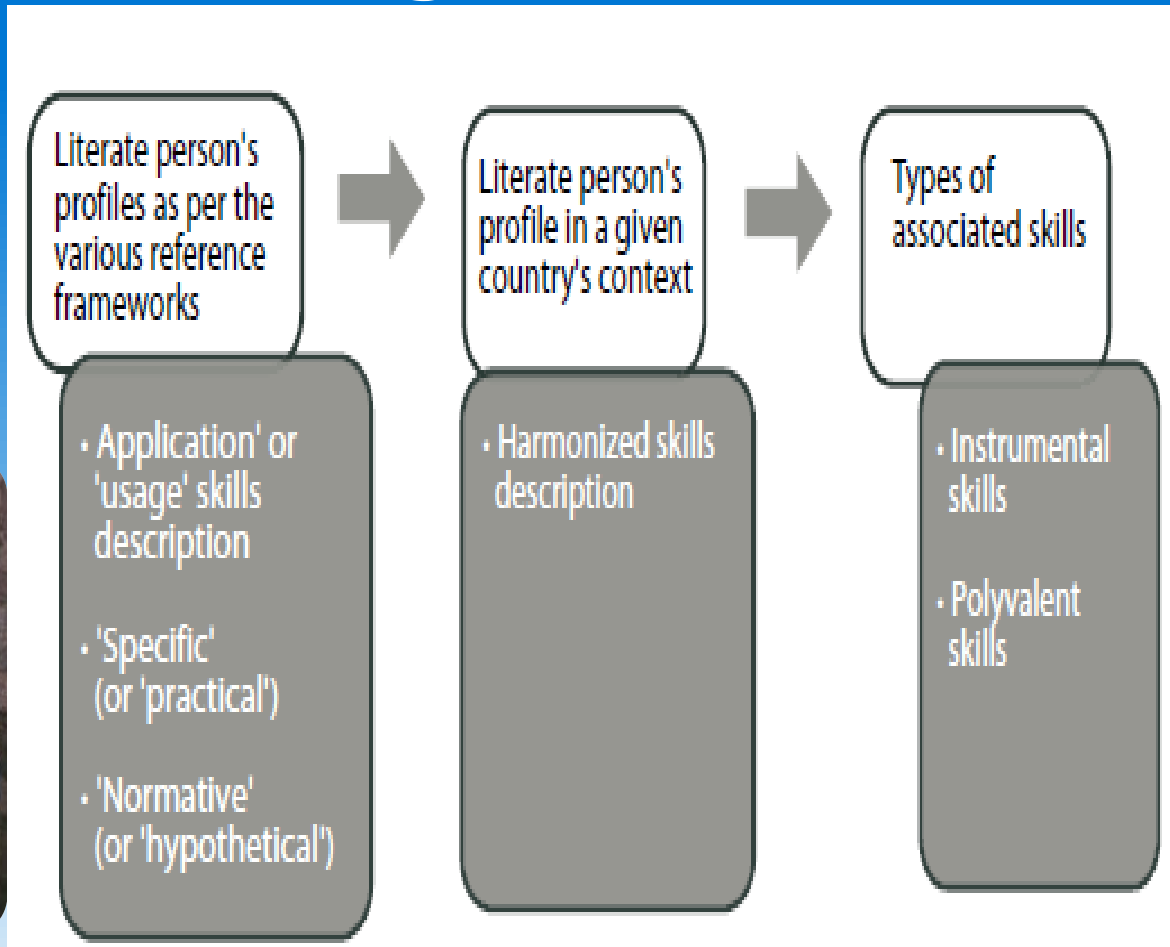


RAMAA (Action Research: Measuring Literacy Programme Participants' Learning Outcomes)



– **5 participating countries of the first phase**: Burkina Faso, Mali, Morocco, Niger and Senegal.





RAMAA harmonized skills descriptions and the associated skills (UIL, 2015)

	LEVEL 1	LEVEL 2	LEVEL 3
READING	**Identify/recognize** written words	**Read** and understand the meaning of a sentence (instruction, rule, etc.)	**Read** and understand a brief text
WRITING	**Spell** dictated words or copy words	**Write** or **complete** a full sentence conveying meaning	**Write** a brief text on a given subject
ARITHMETIC	**Count** objects or currency; write numbers	**Compare** numbers of objects or amounts of currency; more than, less than, equal to, as much as, each, etc.	**Perform operations** with numbers and money
MEASURING	**Read and write** units of time (hour, day, week, etc.), distance and volume (kilometre, metre, kilogramme, etc.)	**Situating oneself** in time and space (before, during, after, above, inside, outside)	**Measuring** time and space

Reference frame: instrumental skills (UIL, 2015)

Instrumental skills : adequate proficiency in basic aspect of literacy and numeracy (ability to read, write, calculate and communicate in at least one language

Reference frame on instrumental skills to be measured as a continuum from level 1 to level 3

RAMAA (Action Research: Measuring Literacy Programme Participants' Learning Outcomes)

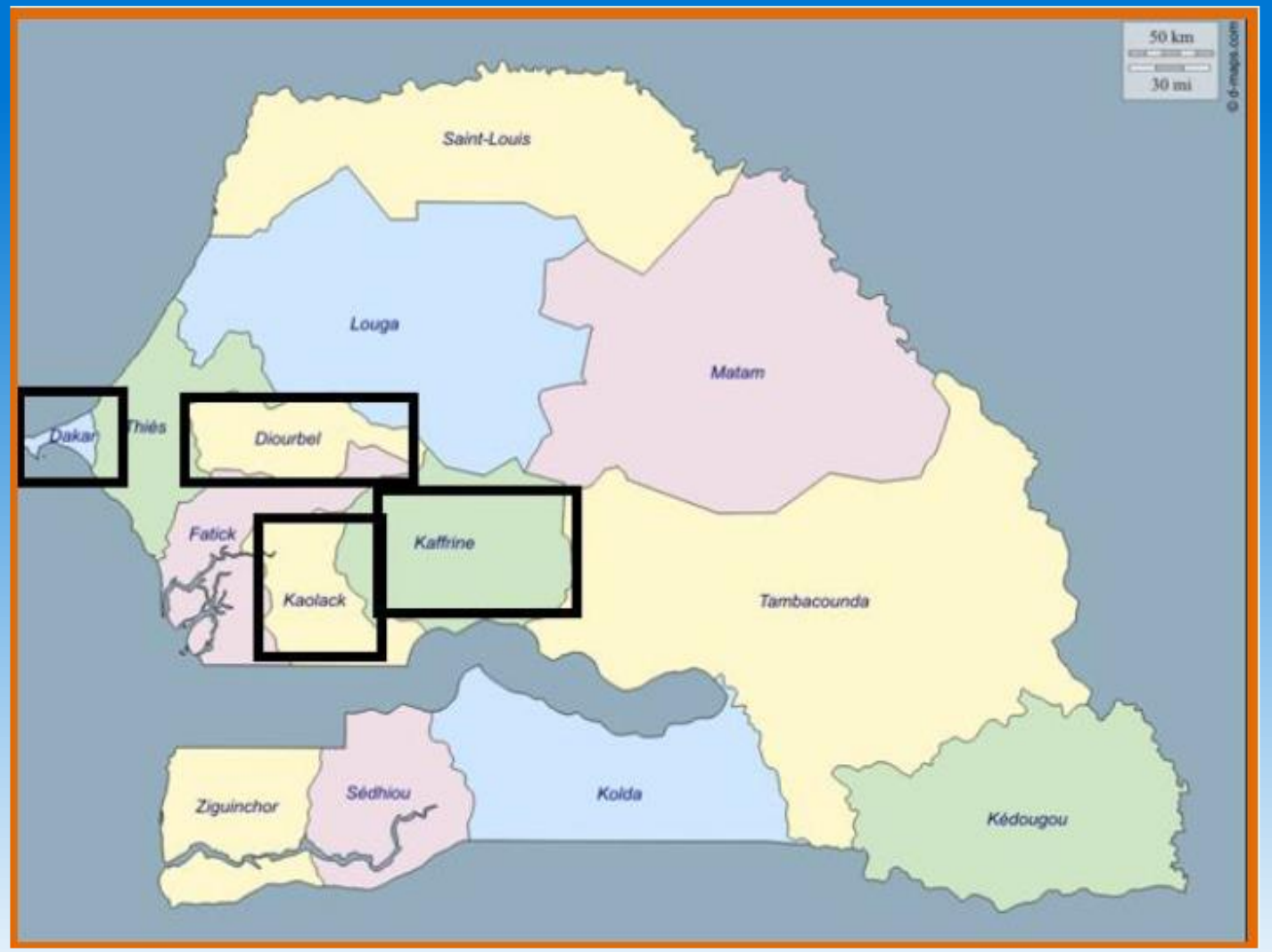
- Different survey plans and the context-specific instruments
- No comparable and standardized measurement tools
- Lack of scientific rigor on sampling frame and data quality in the main survey assessment

Senegal : Much clear information on how to collect the data and measure key instrumental skills

A case of Senegal in RAMAA I

Programme-based sampling for three study groups;

1. Target group : adults (aged 15) who completed a literacy programme in late 2013
2. Control group 1: adults (aged 15) who completed a literacy programme between 2011 and 2012
3. Control group 2: adults (aged 15) who have never taken literacy course



Map of RAMAA-Senegal region (Source: Senegal national report)

Domaine : Santé/nutrition
Situation 3 : Achats à la boutique

Mise en situation : Tu te rends à la boutique pour acheter du maïs pour ton enfant. Choisis le sachet de maïs.

Consigne 1:

Item 9. Encadre le sachet de maïs.

Consigne 2 :

Item 10. Ecris le prix que tu devras payer pour le maïs.

Prix du maïs : .....

Scenario: You make yourself to the store to buy corn for your child. Choose the corn bag.

Statement 1:

Item 9. Manages corn bag.

An example item to measure adult numeracy skills to deal with a life situation

Statement 2:

Item 10. Write the price you have to pay for corn.

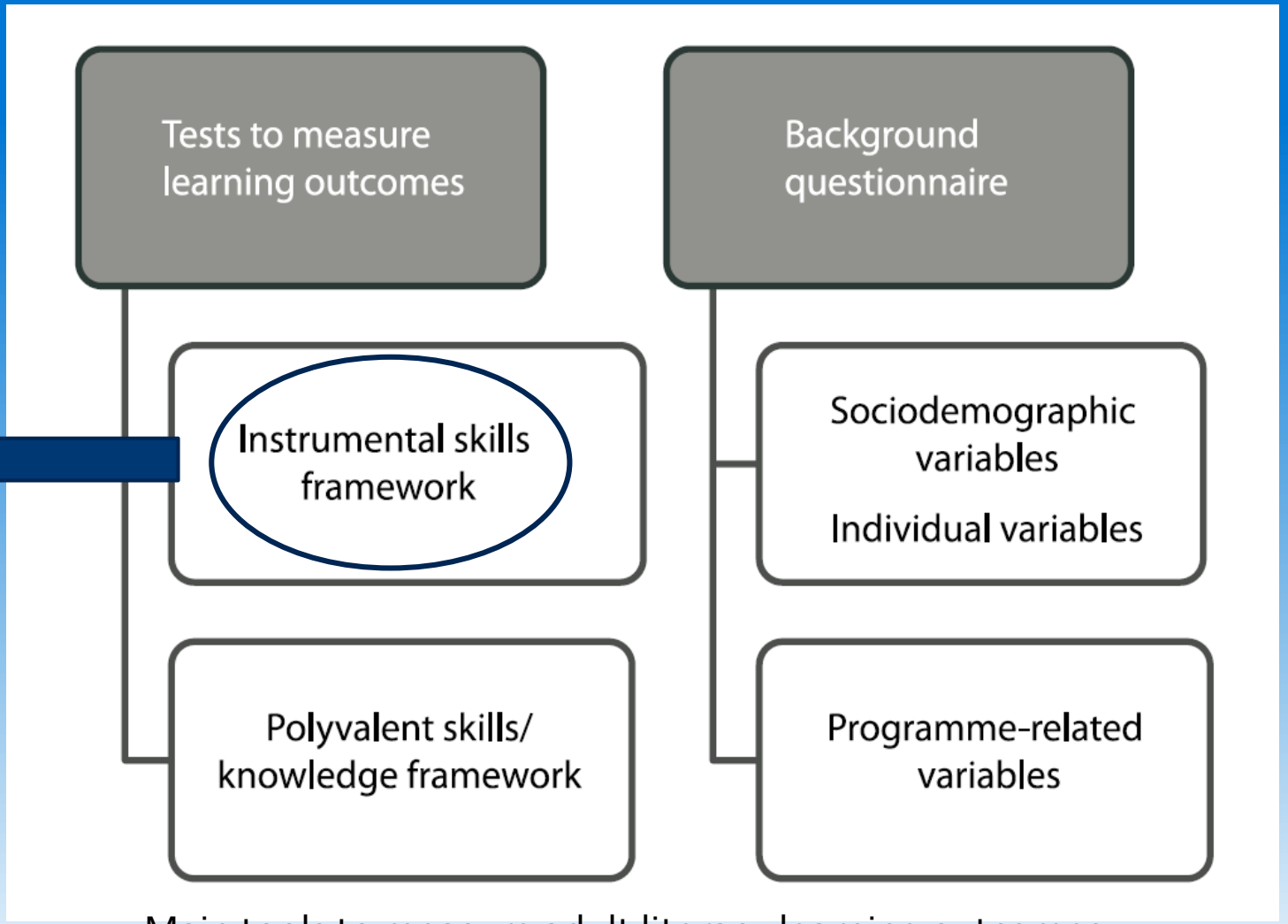
Corn prices: ....

A case of Senegal in RAMAA I

Measurement tools

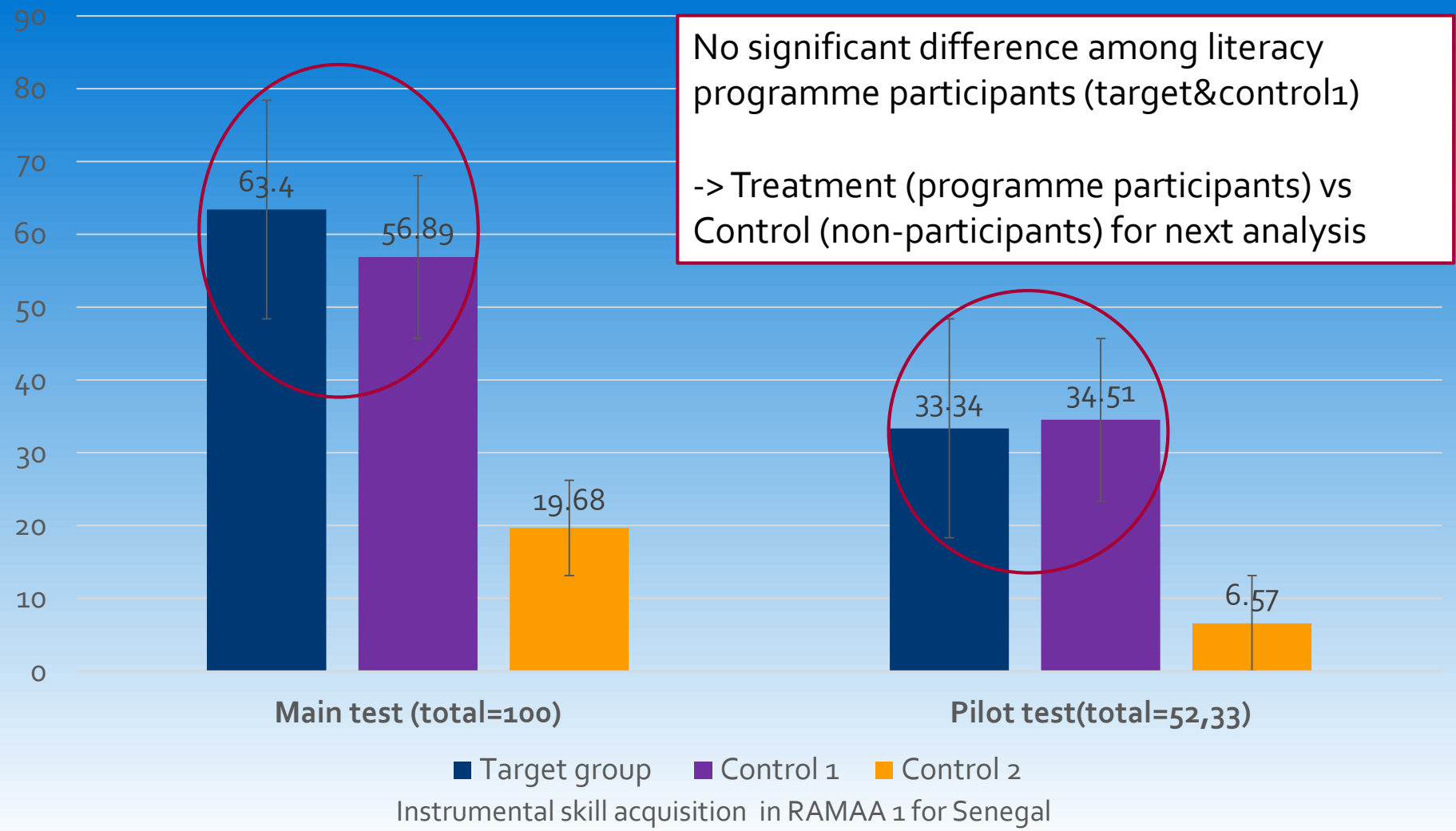
: Senegal in RAMAA applied sets of ***Item-Response Theory analysis*** into measuring an instrumental skill

->This psychometric score is only available in the pilot sample and described in the national report but has not been included in the main assessment-data yet.



Main tools to measure adult literacy learning outcomes in RAMAA(UIL, 2015)

Preliminary results (ANOVA)



No significant difference among literacy programme participants (target&control1)

-> Treatment (programme participants) vs Control (non-participants) for next analysis

No availability of the psychometric score in the main test data

-> Pilot test to be further analyzed

Propensity score analysis for RAMAA I

- A quasi-experimental method used to estimate the difference in outcomes between beneficiaries and non-beneficiaries that is attributable to a particular program.
- A propensity score is an estimated probability that a unit might be exposed to the program.
- In the sample, the propensity scores of all units are used to create a comparison group for measuring the program's impact.

Reduces or eliminates biases in observational studies and estimates the causal effect of a program on an outcome.

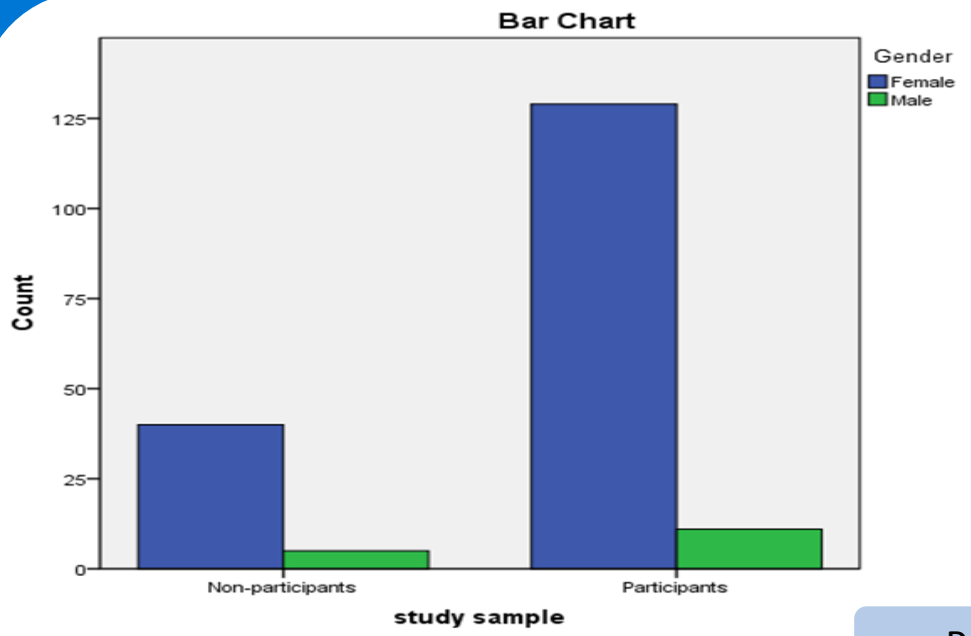
As a programme-based survey assessment, the RAMAA 1 data from Senegal can benefit from the propensity score analysis to measure the empirical effect of adult literacy programme on the learning outcome.

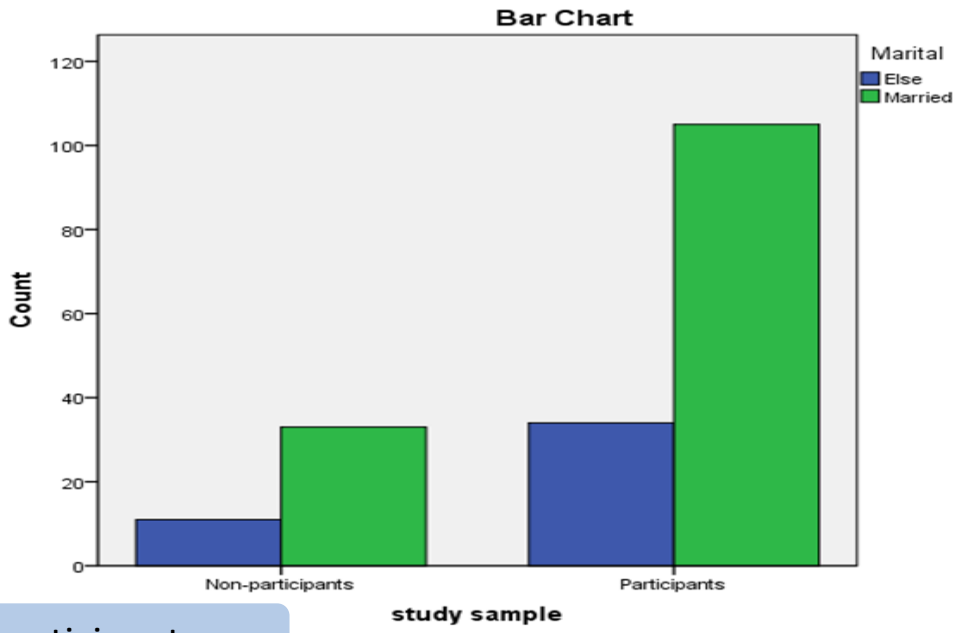
Propensity score analysis for RAMAA I

1. **Estimate the adult's propensity to take literacy programme**

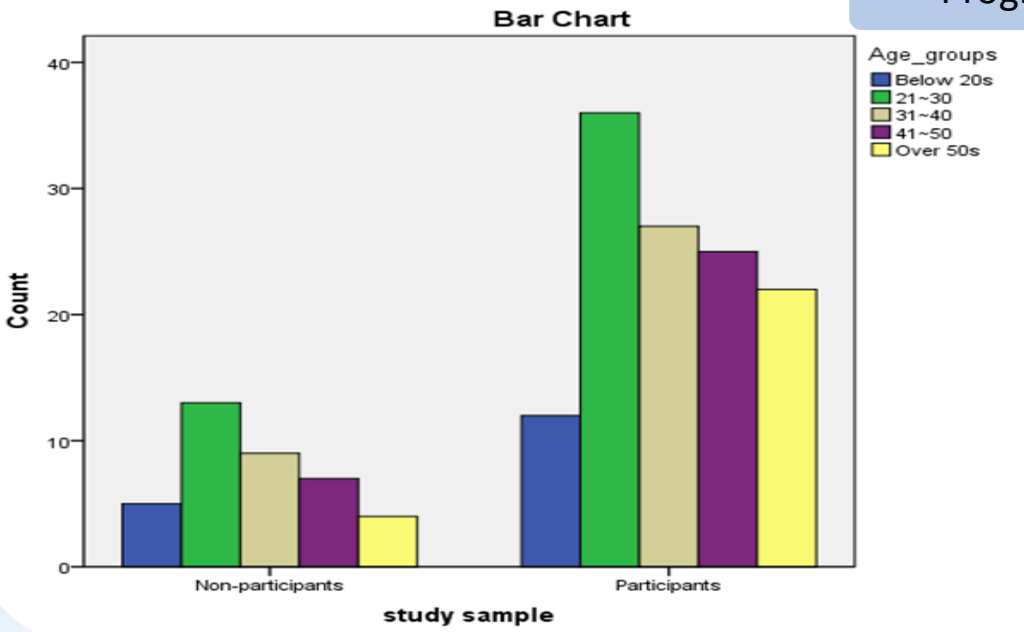
2. **Conduct stratification/matching on the estimated propensity scores within stratum**

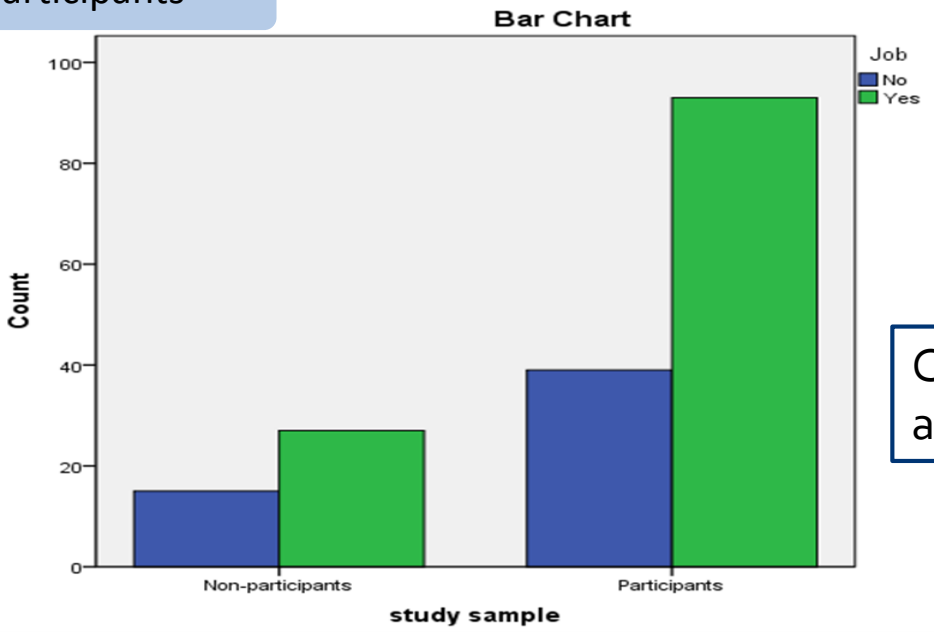
3. **Estimate the average treatment effect (ATE) by calculating mean difference of outcome between treated and control groups within each stratum**





Programme participants





Cross-tabulation analysis

1. Estimate the adult's propensity to take literacy programme

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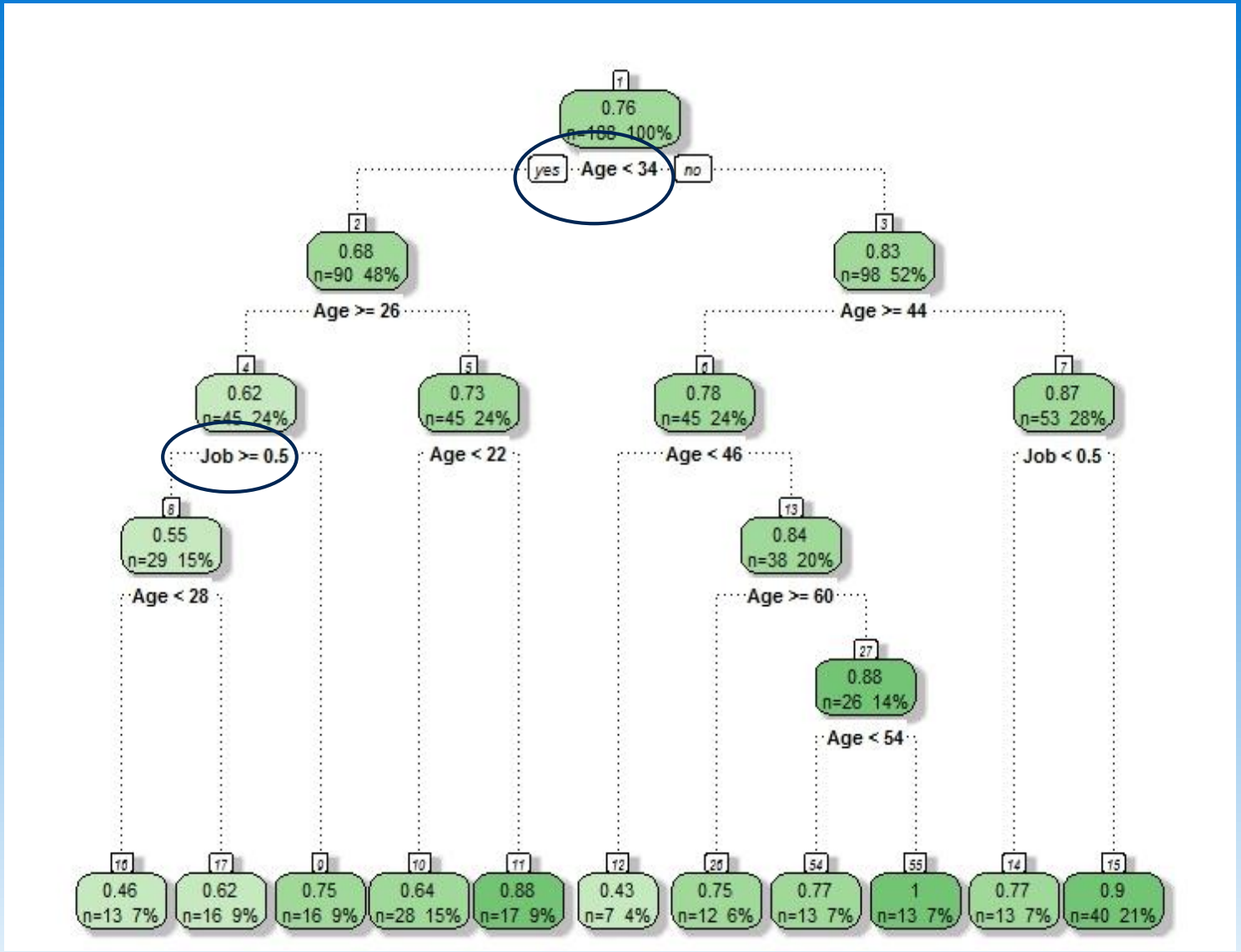
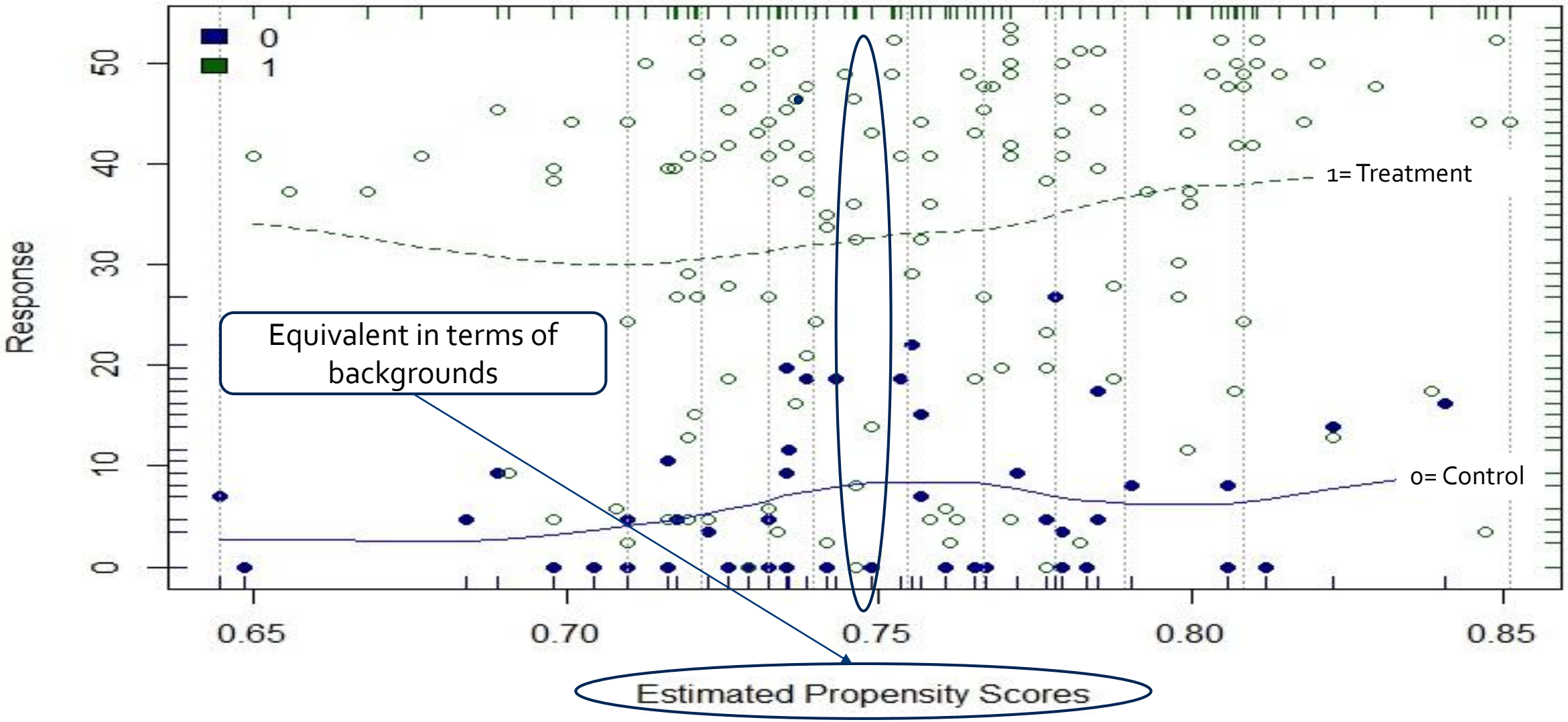


Classification tree analysis

Age and job makes a difference in participating in literacy programme

Adults (younger than 34) with a job are more likely to take literacy programme in Senegal

2. Stratification/matching on the estimated propensity scores

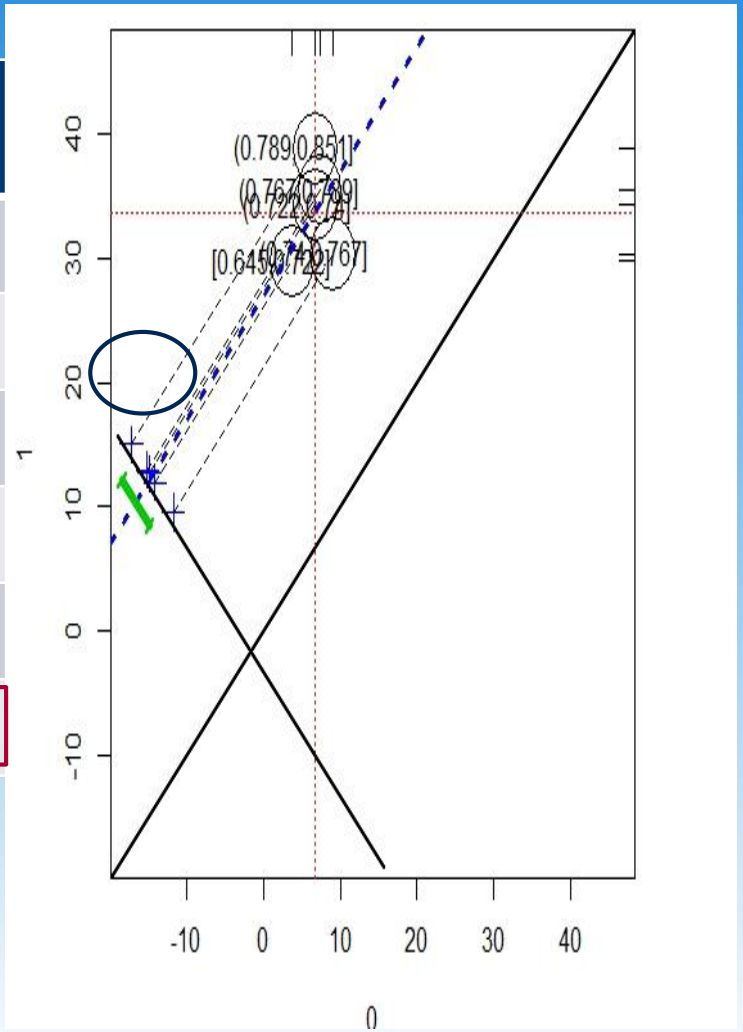


3. Estimate the average treatment effect (ATE)

1. Propensity score stratification

Table. Adult literacy programme effects on instrumental skills within strata

Stratum	Participants	Non-participants	Mean Difference
[0.645,0.722]	29.80441	3.700101	26.10431
(0.722,0.74]	34.24062	6.744756	27.49586
(0.74,0.767]	30.34765	9.044691	21.30296
(0.767,0.789]	35.46811	7.364963	28.10315
(0.789,0.851]	38.863	6.645079	32.21792
Total	33.67848	6.714012	26.96447

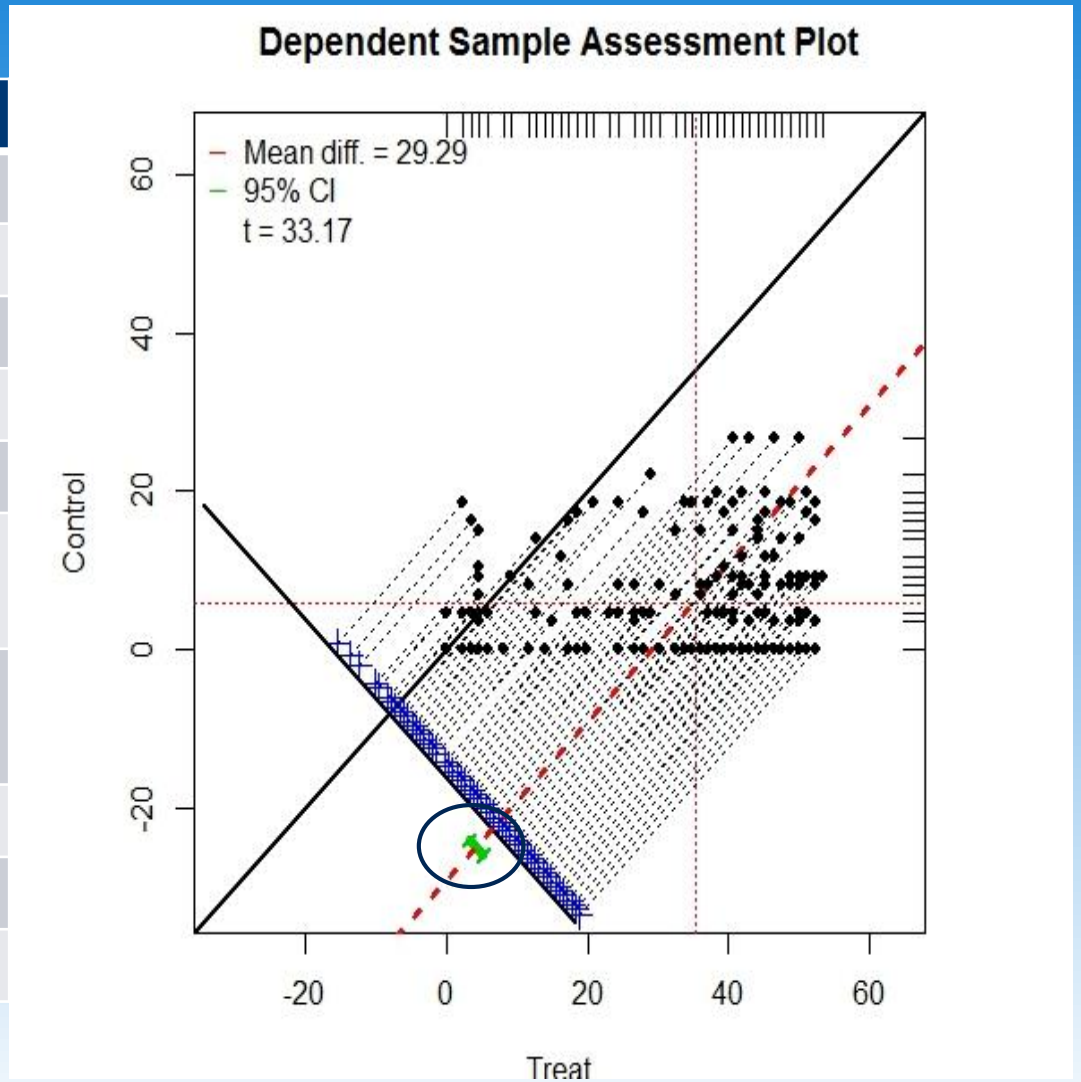


Average Treatment Effect : 26.96447***(t=15.1302, CI .95=23.4480~30.4890)

3. Estimate the average treatment effect (ATE)

2. Propensity score matching

	Statistics
Treat mean	35.251
Control mean	5.965
mean(D = Treat - Control)	29.286
SD(D)	16.087
Effect Size	1.821
Lower 95% Confidence Interval	31.023
Upper 95% Confidence Interval	27.549
t (D-bar)	33.171
df.t	331
p-value (t-statistic)	0

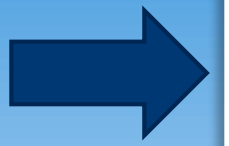


Key results

1. Results of two analytical strategies (ANOVA and PSA) consistently suggest that adults participating in literacy programme in Senegal outperform those who do not participate in instrumental skill assessment.

2. However, inferential analysis (propensity score analysis) finds a smaller difference between two groups compared to descriptive analysis (ANOVA).

3. This implies that difference in instrumental skill acquisition might be more explained by literacy programme participation when controlling variations highly associated with individual backgrounds.



Adult skills gaps need to be considered by wider contexts of life (i.e., adult learning and education)

RAMAA II : Measuring learning outcomes in twelve African countries

Enhancing the measurement tools

- First meeting of the survey design of RAMAA II (February 2017)

Advocacy

- Workshop for graduate students from RAMAA II countries

- **A strong collaboration with 8 UNESCO field offices**: Abuja, Dakar, Rabat, Yaoundé, Abidjan, Bamako, Chad, Kinshasa und UIS.
- **A solid pool of experts**: OECD, the *Centre international d'études pédagogiques* (CIEP), Statistic Canada, researchers and consultants from Canada and universities of Hamburg, etc

Discussions

Exhibit 1.
Adult Numeracy Concept Continuum of Development

PHASE 1	PHASE 2	PHASE 3
Increasing levels of sophistication →		
FORMATIVE **(basic arithmetic skills)**	MATHEMATICAL **(mathematics in context of everyday life)**	INTEGRATIVE **(mathematics integrated with the cultural, social, personal, and emotional)**

A continuum of development of the concept of numeracy showing increased level of sophistication from left to right (from Maguire & O'Donoghue, 2002)

Q1. How to assess integrative phase of the adult numeracy acquisition in RAMAA II?

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Discussions

What do adult numeracy 'levels' mean in the assessment?

Adult UK	Schools		Vocational		International
England Wales	England Northern Ireland Wales	Scotland	England Northern Ireland (NQF) Wales (CQFW)	Scotland (SCQF)	PIAAC IALS, ALL
Level 2	New GCSE 9 - 4 Old GCSE A* - C	National 5	Level 2	Level 5	Level 4
Level 1	New GCSE 3 - 1 Old GCSE D - G	National 4	Level 1	Level 4	Level 3
Entry Level 3	Expected age 9 to 11	National 3	Entry Level	Level 3	Level 2
Entry Level 2	Expected age 7 to 9	National 2		Level 2	Level 1
Entry Level 1	Expected age 5 to 7	National 1		Level 1	Below Level 1
Pre-Entry			Pre-Entry		

Q2. How to strike a balance between international standard on adult numeracy and national framework ?

Q3. What would this imply for RAMAA II assessment? (Pros/Cons)

Source: www.nationalnumeracy.org.uk/ National numeracy

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