New look at household and poverty data

Instructions: Click on the link to access each author's presentation.

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Participants:

Manana Dewage Diana Dilshanie Deepawansa: Assessing Multidimensional Poverty Measures in Sri Lanka on an innovative approach to tracking progress towards the SDGs

Jean Pierre Adiouma NDIAYE:* Multidimensional poverty in Senegal: design of a household vulnerability assessment tool

Kossi Edem Kludza: Unmasked Realities: Unraveling the Impact of COVID-19 on SDG 3 Health and Wellbeing Indicators in Africa

Alejandro Pimentel: Integrating AI into Household Survey Data Encoding Workflows

* Work presentation not available or non-existent

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Assessing Multidimensional Poverty Measures in Sri Lanka on an innovative approach to tracking progress towards the SDGs

Presenter

Dr Dilshanie Deepawansa

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Outline

- Introduction
- Sri Lanka: Poverty measures
- Current Approaches to Tracking SDG
- Multidimensional Poverty in Sri Lanka
- Need for Innovative Approaches
- **Innovative Approach (Synthesis Method)**
- **Key Finding**
- Significance of the Study

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Introduction

*The innovative approach called "**the Synthesis method**" applied for this analysis focus on more accurate and up-to-date poverty measures in a multidimensional approach*

- Poverty is not merely a lack of wealth but a cycle of disadvantages with limited opportunities and social exclusion influenced by various factors; experiences of poor at the same time
- The traditional tools used to measure poverty often focus solely on wealth
- Tracking progress towards the Sustainable Development Goals (SDGs) is more importance for several reasons:
  - Accountability: governments, organizations, and stakeholders
  - Evaluation of Policies and Programs
  - Resource Allocation
  - Identifying Gaps and Challenges
  - Ensuring Leave No One Behind

Sri Lanka: Poverty measures

- Sri Lanka, an island located in South Asia, has a diverse cultural heritage and a complex socio-economic landscape reflects a mix of opportunities and challenges.

- The country has made progress in key areas such as education, healthcare, and infrastructure, However disparities exists , and need for sustained efforts to development across all segments of society

- Sri Lanka has made fairly good progress in reducing poverty on a national from 46.8% in 2002 to around 14.3% in 2019 , significant disparities exist across districts, highlighting the need to ensure that all communities have access to opportunities for sustainable development and improved quality of life

- As in many countries, Sri Lanka has been emphasizing measuring poverty through a multidimensional approach on AF method take into account dimension of health, education and living standard

Current Approaches to Tracking SDG Progress in poverty

End poverty in all its forms everywhere" (Sustainable Development Goal 1) is a central goal of the development agenda of the Government of Sri Lanka.

Monetary

1. OPL on Consumption poverty (Income poverty)

   Cost of Basic Needs(CBN) – (SDG 1.2.1)

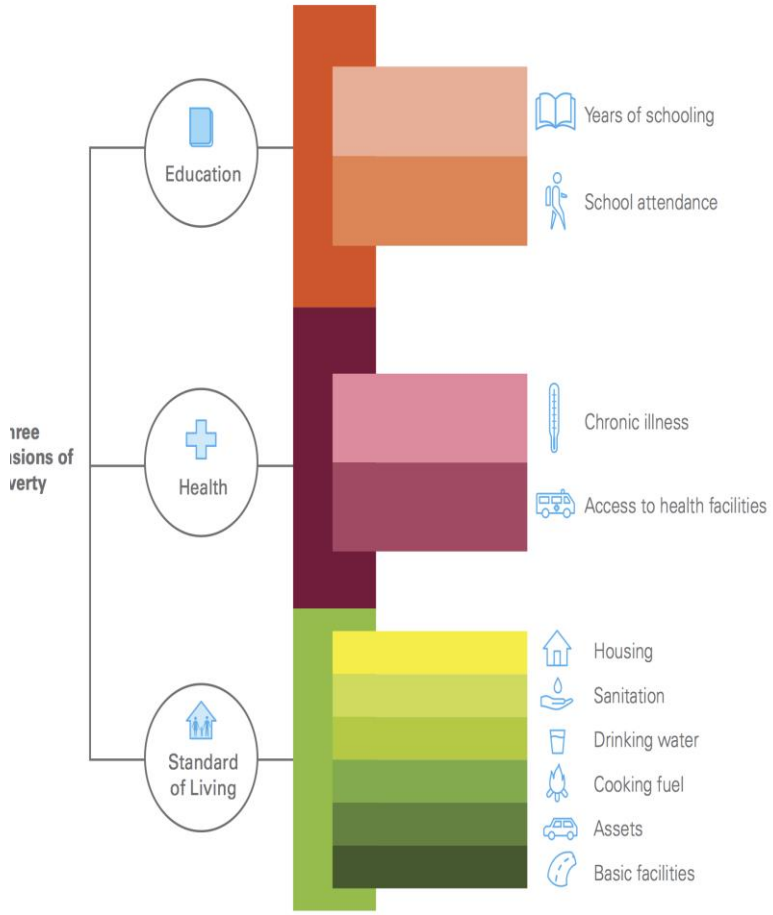
MPI(Non monetary) – SDG 1.2.2

2. Multidimensional Poverty Measures (MPI)
   - National Multidimensional Poverty Index (NMPI)
   - Child Multidimensional Poverty Index (CMPI)

Multidimensional Poverty in Sri Lanka

kire and Foster Method

Poverty Cut-off (k)	Index	Value	Confidence Interval (95%)	
k value=33%	MPI	0.067	0.062	0.071
	Incidence or headcount ratio (H)	16.0 %	15.0 %	17.1%
	Intensity (A)	41.6 %	41.2 %	42.1%



Limitations and Challenges

- Data Availability and Quality
- Subjective Weighting -Normatively
- Threshold Selection: Setting indicator and poverty cut-off
- Sensitivity to Methodological Choices-the selection of dimensions, indicators, weights, and thresholds

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Need for Innovative Approaches

- Income poverty provide an incomplete picture of poverty dynamics and fail to capture the different experiences and vulnerabilities experience by poor populations.
- Dimensions of poverty are interconnected and mutually strengthening.
- interconnections can provide more holistic insights into poverty dynamics and help identify effective interventions to break the cycle of poverty.
- To capture heterogeneity of poverty by different socio economic groups
- Can develop more comprehensive, contextually relevant, and transformative approaches to understand, address, and ultimately eradicate poverty in all its forms.

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Innovative Approach measure Multidimensional Poverty (Synthesis Method)

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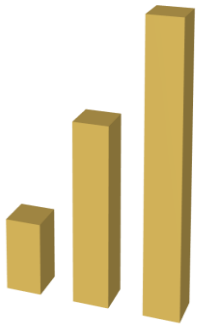
Synthesis method

Augmented method of the Fuzzy Sets Method (Cerioli & Zani, 1990) and the Counting Method (Alkire & Foster, 2007; Alkire et al.2015)



ii) Aggregation

Counting Method

Two main steps

i) Identification of deprivation

Fuzzy Membership Function introduced

i) Fuzzy Headcount Index (FHI);

ii) Fussy Intensity (FI) ;

iii) Adjusted Fuzzy Deprivation Index (FM0)- (FHI*FI)

iv) Normalized Deprivation Gap Index (FMG); and,

v) Squared Normalized Deprivation Gap Index (FMSG).

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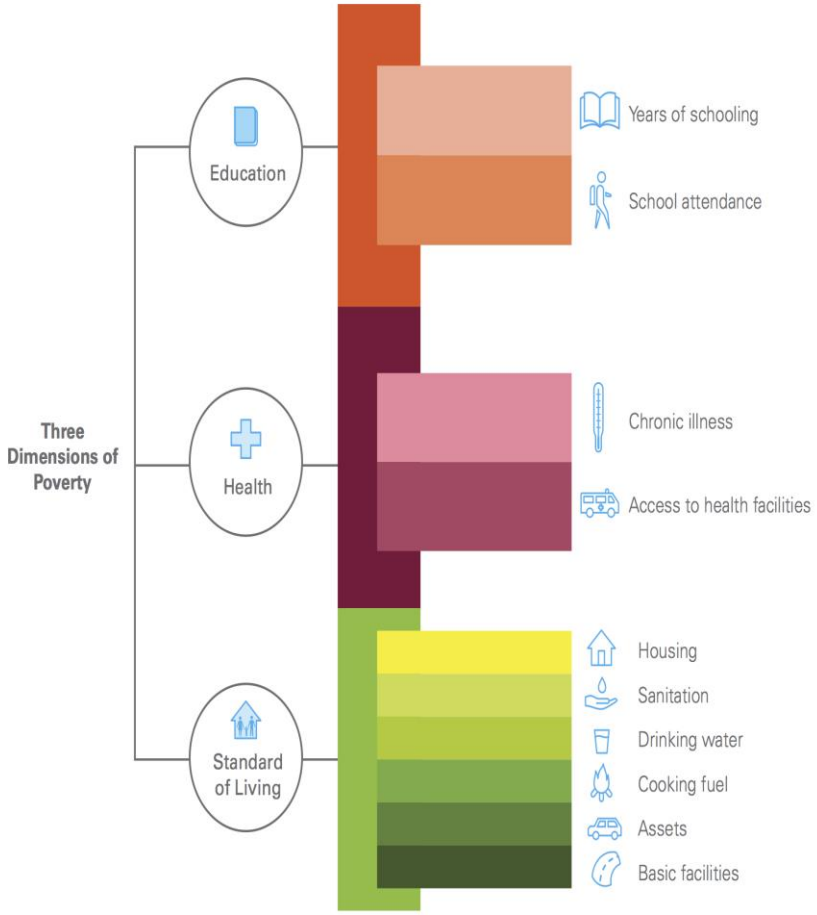
Design and Data

- Design of Fuzzy MPI: 10 indicators grouped into three dimensions.
- Data: Compiled using the data from the Household Income and Expenditure Survey conducted in 2019 conducted by the Department of Census and Statistics-Sri Lanka
  - Unit of identification: Household
  - Unit of analysis: Individual



Method

Totally Fuzzy (TF) method calculates the degree of deprivation for each indicator in terms of fuzzy membership for each individual

Denote each individual a grade of membership in the sub set poor(μ_{Ai}) ;

If $\mu_{Ai} = 0$; i[th] individual is not definitely belong to poor
If $\mu_{Ai} = 1$; i[th] individual is completely poor
If $0 < \mu_{Ai} < 1$ then i[th] individual is partially belong to poor sub set

The value of the membership function is given by the following equation.

Consider q_{ji} is the value of i[th] individual in j[th] indicator where (i=1,2……n) and (j=1,2……k) in the poor set μ_A.

Then the membership faction for each individual is;

$\mu_{Ai}(j) = 1$ if $q_{ij} < j_{min}$

$\mu_{Ai}(j) = \frac{q_{j,max} - q_{ij}}{q_{j,max} - q_{j,mim}}$ if $j_{min} < q_{ij} < j_{max}$

$\mu_{Ai}(j) = 0$ if $q_{ij} \geq j_{max}$

Cont.....

1. Compute the weighted deprivation score for each indicator for all individuals and create sum of weighted deprivation score for each individual in all dimensions.

$$\omega_j = \frac{ln\frac{1}{f_j}}{\sum_{j=1}^{k} ln\frac{1}{f_j}}$$

ω_j : Weight for j[th] indicator

f_j :Individuals who are completely deprived in j[th] indicator

2. Weighted fuzzy deprivation was calculated using following equation:

$$\mu_{Ai} = \sum_{j=1}^{k} \omega_j \times \mu_{Ai}(j)$$

3.The average weighted Fuzzy deprivation score in multidimensional poverty is,

$$FM = \mu_A = \frac{1}{N}\sum_{i=1}^{n} w\mu_{Ai}$$

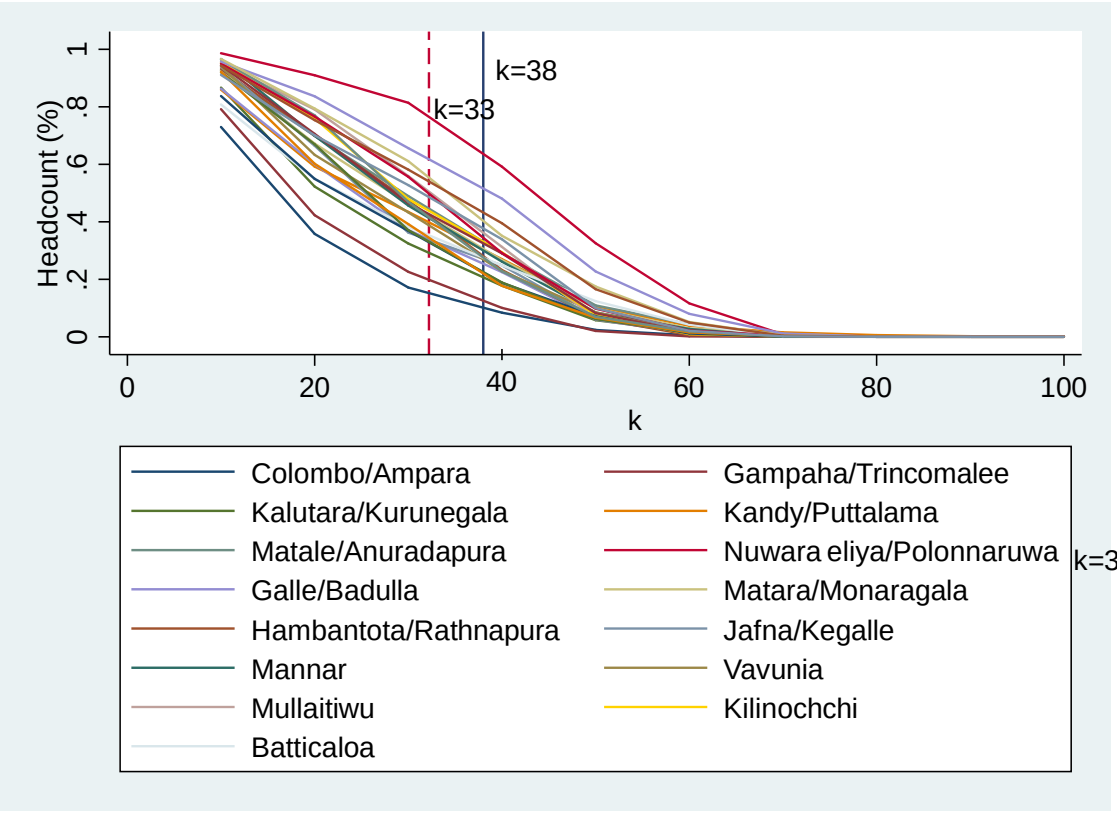
where N denotes the population size

Identify the multidimensional poor individual

Kendall's tau_b test for ranking correlation

	multi~31	multi~32	multi~33	multi~34	multi~35	multi~36	multi~37	multi~38	multi~39	multi~40
multid_Fz~31	1.0000 42.8174									
multid_Fz~32	0.9800 42.8174 0.0000	1.0000 42.8174								
multid_Fz~33	0.9267 42.8174 0.0000	0.9333 42.8174 0.0000	1.0000 42.8174							
multid_Fz~34	0.8733 42.8174 0.0000	0.8667 42.8174 0.0000	0.8667 42.8174 0.0000	1.0000 42.8174						
multid_Fz~35	0.8733 42.8174 0.0000	0.8667 42.8174 0.0000	0.8667 42.8174 0.0000	0.9733 42.8174 0.0000	1.0000 42.8174					
multid_Fz~36	0.8533 42.8174 0.0000	0.8467 42.8174 0.0000	0.8467 42.8174 0.0000	0.9800 42.8174 0.0000	0.9667 42.8174 0.0000	1.0000 42.8174				
multid_Fz~37	0.8733 42.8174 0.0000	0.8800 42.8174 0.0000	0.8533 42.8174 0.0000	0.9333 42.8174 0.0000	0.9200 42.8174 0.0000	0.9400 42.8174 0.0000	1.0000 42.8174			
multid_Fz~38	0.8533 42.8174 0.0000	0.8600 42.8174 0.0000	0.8600 42.8174 0.0000	0.9400 42.8174 0.0000	0.9267 42.8174 0.0000	0.9467 42.8174 0.0000	0.9800 42.8174 0.0000	1.0000 42.8174		
multid_Fz~39	0.8400 42.8174 0.0000	0.8467 42.8174 0.0000	0.8200 42.8174 0.0000	0.8733 42.8174 0.0000	0.8867 42.8174 0.0000	0.8933 42.8174 0.0000	0.9133 42.8174 0.0000	0.9333 42.8174 0.0000	1.0000 42.8174	
multid_Fz~40	0.8267 42.8174 0.0000	0.8333 42.8174 0.0000	0.7933 42.8174 0.0000	0.8600 42.8174 0.0000	0.8600 42.8174 0.0000	0.8800 42.8174 0.0000	0.9000 42.8174 0.0000	0.9067 42.8174 0.0000	0.9467 42.8174 0.0000	1.0000 42.8174

Headcount index by different k values by district



A person considered to be multidimensionally poor or not with respect to the selected poverty cut-off and aggregated weighted deprivation score.

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Key Findings

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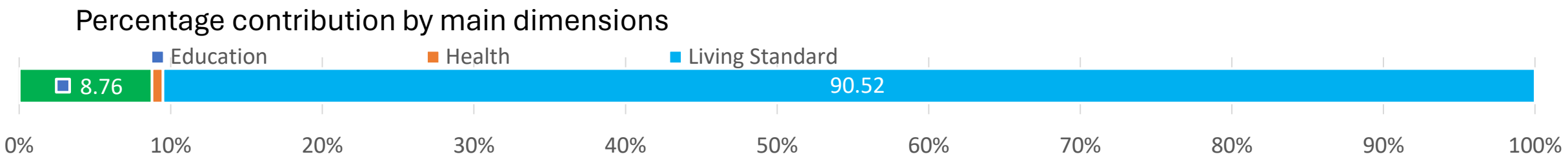
Multidimensional Fuzzy Poverty Measures

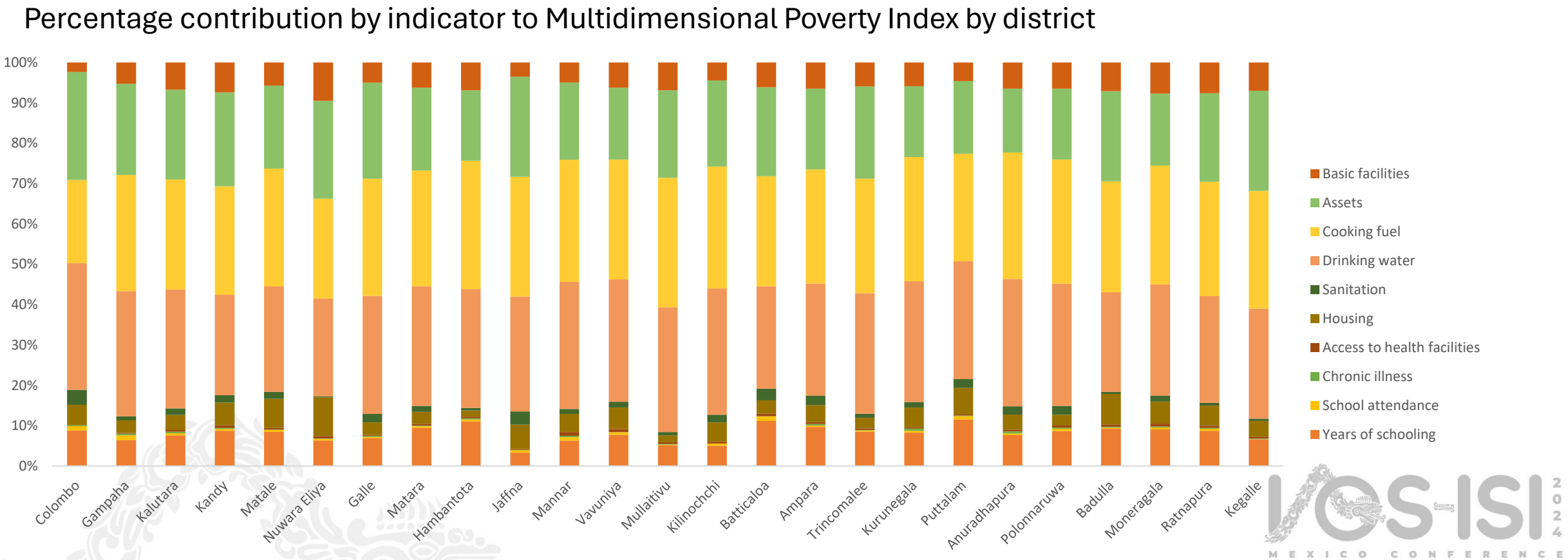
Average Fuzzy Deprivation **27.2%**

Family of Fuzzy Poverty Indices

Fuzzy Headcount Index (FHI)	Fussy Intensity (FI)	Adjusted Fuzzy Deprivation Index (FM0)	Normalized Deprivation Gap Index (FMG)	Squared Normalized Deprivation Gap Index (FMSG)
32.8%	45.6%	0.150	12.5%	7.3%

Shape Policy and Budget Decisions





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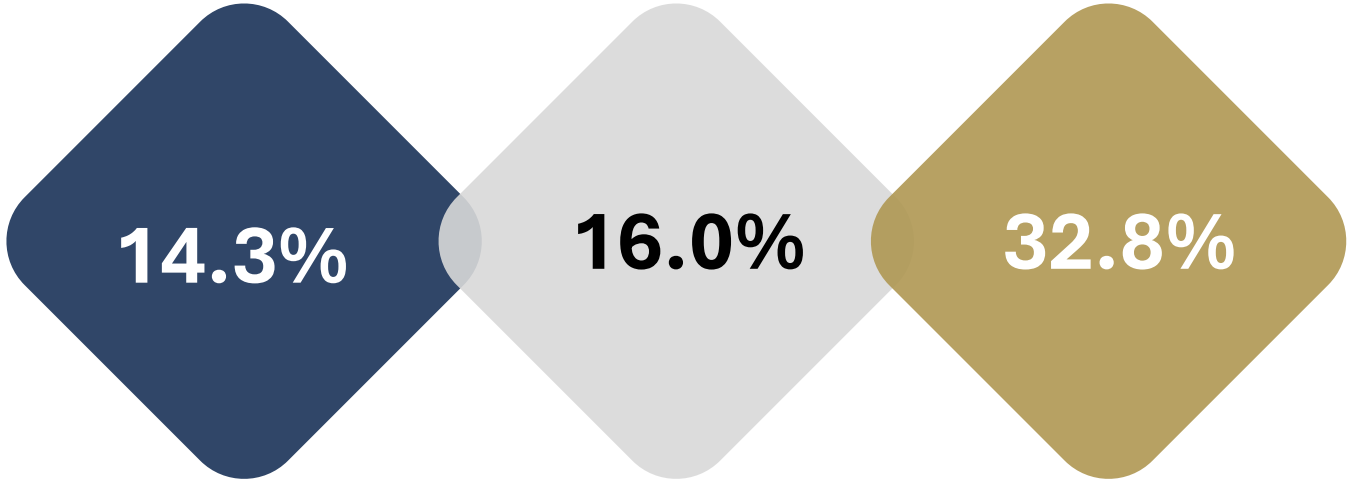
Comparison



Monetary Poverty

Based on Cost of Basic need method

NMPI

AF Counting approach

FHI

Synthesis Method

How an innovative approach tracking progress towards the SDGs

Better equipped policy makers to reduce poverty

- To see how many individuals are experiencing different deprivations at the same time.
- To see how many individuals are experiencing of deprivation by different indicators independently.
- Can be used for monitoring and evaluating the programs that uses for targeting poor: *e.g. conditional cash transfer programs.*
- Can be used as instrument for budget allocation for different targeting programs for poverty reduction.
- Can be disaggregate by different social groups and identified most affected groups
- It can be used as a tool for policy coordination to alleviate poverty across districts, sector and regions.

Covered SDGs

- SDG 1 (No Poverty)
- SDG 3 (Health & Well-being)
- SDG 4 (Quality education)
- SDG 6 (Clean Water & Sanitation)
- SDG 7 (Affordable & Clean Energy)
- SDG 9 (Infrastructure)
- SDG 11 (Sustainable Cities & Communities)

Can be used to show the success leaving no one behind in principle.

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Significance of the Study

- Introduction of a new method to measure multidimensional poverty called “Synthesis Method” borrowing well recognized techniques and addresses some limitations in existing predominantly used methods.

- Recognize the heterogeneity of poverty experiences and tailor measurement frameworks to specific contexts can enhance the relevance and accuracy of poverty assessments by using data driven weight function

- Provide action-oriented poverty profiles of interlinked deprivations that policy actors in each sector, district, or priority area can use strategically to design high-impact activities

- very relevant in the context of the 2030 development agenda : the leaving no one behind principle.

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Pathways to achieving SDG3 - Health and Wellbeing in Africa:

To what extent has COVID-19 disrupted?

Edem Kossi Kludza,
Associate Statistician and International Development Economist

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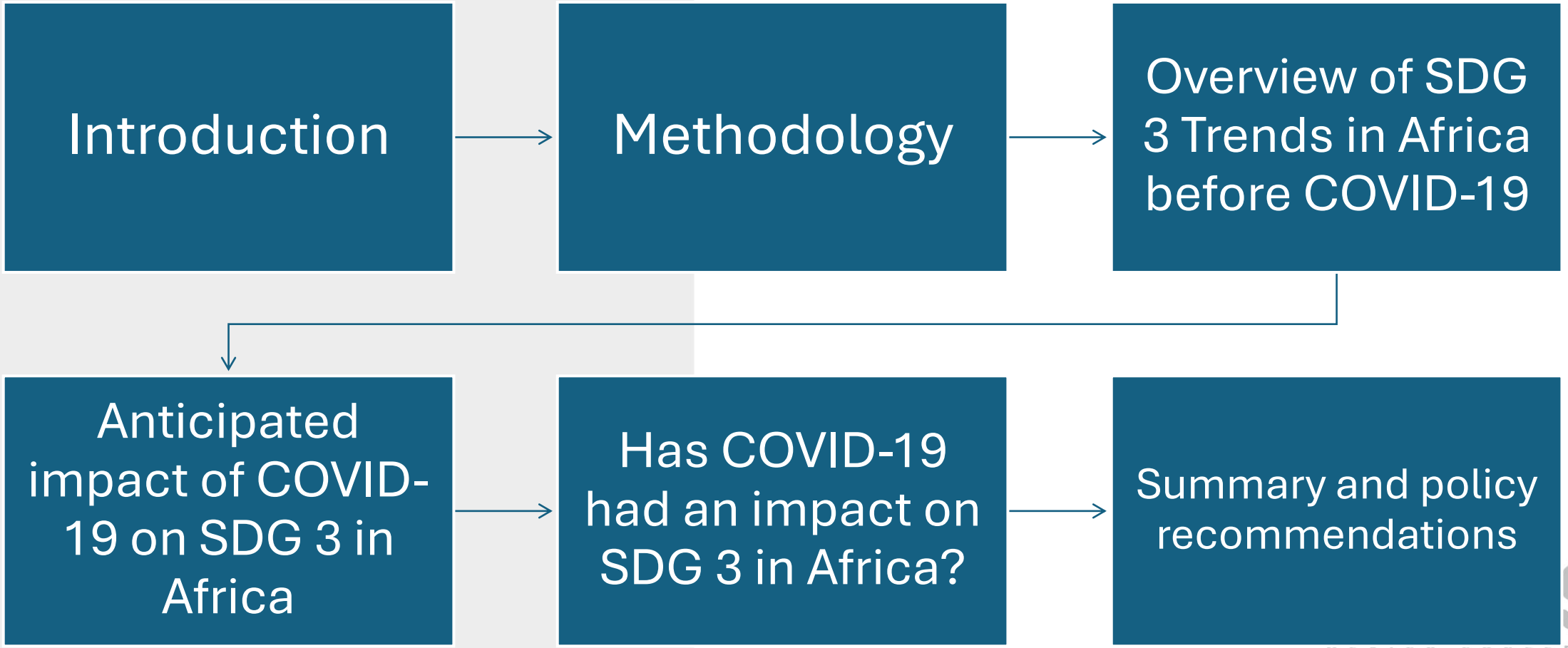
Outline



Introduction

- Pessimistic early estimates on the preparedness of the health system on the continent to face a disease that has brought down the health system of developed countries.

- Considerable concerns emerged regarding the potential devastating consequences in Africa especially for SDG 3 (Health and Wellbeing) indicators.

- COVID-19 has shown that development agendas cannot be fully implemented or achieved if it is not strategically anchored in the wellbeing and health of people.

- This study aims to investigate whether the COVID-19 pandemic has indeed significantly impacted SDG 3 indicators on the continent.

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Methodology

This paper used a joint approach of desk review and empirical analysis.

- Desk research: synthetizing available information on trends and potential impact on the pandemic on SDG 3.
- Empirical analysis consisted of a statistical inference to test for any significant difference between the rate of progress pre- and post-COVID 19
- Data is from the United Nations Global SDG database.

Statistical inference

Paired samples t-test (n>=30) and Wilcoxon signed-rank test (n<30)

The hypotheses were formulated as below:

$$\begin{cases} H_0\colon R_{<2019} = R_{>2019}, the\ pandemic\ has\ had\ no\ impact \\ H_1\colon R_{<2019} \neq R_{>2019}, the\ pandemic\ has\ impacted \end{cases}$$

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Overview of SDG 3 Trends in Africa before COVID-19

Before the COVID-19, data suggested that many African countries have made progress on many SDG 3 indicators.

Northern African countries appeared to be closer to the targets compared to Sub-Saharan African countries.

Notwithstanding, regression was also recorded

Before COVID-19, the pace of progress was not sufficient to meet all the targets under Goal 3.

	Indicators with some progress	Indicators with regression
1	Maternal mortality (3.1.1)	Household expenditures on health (3.8.2)
2	Under-five mortality (3.2.1)	Road traffic fatalities (3.6.1)
3	Neonatal mortality (3.2.2)	
4	HIV infections (3.3.1)	
5	Tuberculosis incidence (3.3.2)	
6	Malaria incidence (3.3.3)	
7	Skilled health workers (3.5.1)	
8	Essential health services coverage (3.8.1)	
9	Vaccination coverage (3.b.1)	
10	Health workers density (3.c.1)	

Anticipated impact of COVID-19 on SDG 3 in Africa

- Demand for policy making or for academic purposes: use analytical tools or common judgement to predict its impact in the socioeconomic sphere.
- SDG Centre for Africa: the pandemic faced a fragile, unprepared, and unfunded health system on the continent.
- A study by Haixia Yuan et al. found that Goal 3 was among the worse to be affected on the continent along with Goal 9 and 11 and 16.
- *"at least 253 500 additional child deaths and 12 200 additional maternal deaths over a period of 6 months in 118 countries"*. Africa was expected to bear the heavy load.
- Malaria would rise to kill approximately **0.8 million** in Sub-Saharan Africa setting the continent back to the **mortality rates in the 2000s**.
- "*Africa could register 500,000 extra deaths from AIDS and TB-related illnesses during the period 2020–2021*".
- Outbreak of vaccine-preventable diseases with **21 million children left unprotected** against those diseases such as measles.
- ODA for health would decline drastically.

Has COVID-19 had an impact on SDG 3 in Africa?

And to what extend?

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Overview of the calculated rates of progress pre- and post-COVID19

1…. on reproductive and maternal health

3.1.1

Maternal mortality rate (3.1.1) was declining in 45 countries before the pandemic, 21 of them reported an increase between 2019 and 2022 while 8 reported a lower annual rate. The highest deteriorations were observed in Mauritius, Botswana, Seychelles, and Ghana.

3.2.2

All the 52 countries that reported decreasing trends in neonatal mortality rates (3.2.2) before the pandemic, experienced the same trend after COVID-19. However, 39 countries reported a slow acceleration.

3.2.1

Regarding infant mortality rate (3.2.1), all countries that were reducing the rate before the pandemic reported the same trend after the pandemic.

Overview of the calculated rates of progress pre- and post-COVID19

2…. … on infectious and non-communicable diseases

3.3.1

HIV incidence (3.3.1) was declining in 44 countries before the pandemic, 39 of which experienced the same trends after the pandemic.

3.3.2

A vast majority of 44 countries were experiencing a decline in TB incidence before COVID-19, out of which 43 reported the same trends after COVID-19.

3.3.3

Malaria incidence (3.3.3) has been declining in 27 countries on the continent. 17 of these reported an increase after the pandemic. Of particular interest are countries with the highest rates of change such as Namibia, Madagascar, the Gambia, Guinea Bissau and Senegal.

Overview of the calculated rates of progress pre- and post-COVID19

3. … on health systems and funding

3.8.1

Before 2019, universal health coverage (3.8.1) has been increasing in 43 countries out of which 26 reported a slight amelioration even after COVID while 13 countries reported a slight deterioration

3.a.1

It was observed that tobacco usage (3.a.1) continued its steady decrease even after the pandemic among male and female adults.

3.b.1

The progress on vaccination programmes (3.b.1) appeared to have slowed down.

3.b.2

The annual rate of progress for ODA to medical sector (3.b.2) was negative after the pandemic while it was positive before the pandemic.

Results of the statistical tests and discussions

The 13/87 percent ratio:

The direct impact of COVID-19 was quite limited. Only 13.4% of the 52 series or sub-indicators included in the analysis have experienced significant impact due to the pandemic.

	Impacted indicators	Series description
1	3.1.1	Maternal mortality ratio
2	3.3.4	Prevalence of hepatitis B surface antigen (HBsAg) (%)
3	3.b.1	Access to 3 doses of diphtheria-tetanus-pertussis (DTP3) (%)
4	3.b.1	Access to human papillomavirus (HPV) (%)
5	3.b.1	Access to pneumococcal conjugate 3rd dose (PCV3) (%)
6	3.b.2	ODA to the medical field, net
7	3.c.1	Health worker density, physicians

Limit of the study

Conceptual limitation: The study assumes that the COVID-19 was the only major event between 2019 and 2020 in the assessed countries and that all changes in SDG trends are attributed to the pandemic. While there is a large unanimity of viewpoint on this, one may argue that is a very strong assumption.

Practical limitation: This relates to data availability in African countries. Out of the 28 indicators under SDG 3, only 14 indicators had enough data to proceed with the analysis. We also assumed that all reported data and statistics are of good quality since they followed the quality assurance of data and statistics on Sustainable Development Goal indicators

What Africa did differently?

General measures	Specific to Africa
a. Public health measures (Vaccination, testing, isolation, etc.)	a. Early response and preemptive measures
b. Social distancing measures (limitation on public gathering, lockdown, boarder control, etc.)	b. Leveraging experience with previous epidemics
c. Communication and community engagement (awareness, prevention, support to vulnerable, etc.)	c. Innovative solutions (mobile technology, exploring traditional medicine, etc.)
	d. Ubuntu, regional collaboration and solidarity

Exogenous factors: warm climate, youthfulness of the population, low rate of urbanization, the low volume of international transit with other continents.

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Summary

- What is already known about this topic?
  - COVID-19 was expected to have a devastating impact on health systems in Africa. The ravage of the pandemic has appeared to be less than expected compared to its impact in developed countries.
- What is the value-added by this study?
  - Using available data, the study brought evidence that the continent has shown resilience during the pandemic defying all odds. It has also revealed what particular indicators were significantly impacted in Africa.
- What are the implications for public health practice?
  - Countries should document good practices and lessons learnt to build more resilience in case of future shocks.
  - Since a few indicators were affected, especially in some countries, country analysis should be conducted to identify areas of targeted intervention to recover from the curve.

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Thank you

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Integrating AI into Household Survey Data Encoding Workflows

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Introduction

- Statistical offices regularly generate products that involve the coding of records
- Due to its costs, many organizations have begun to use computational tools.

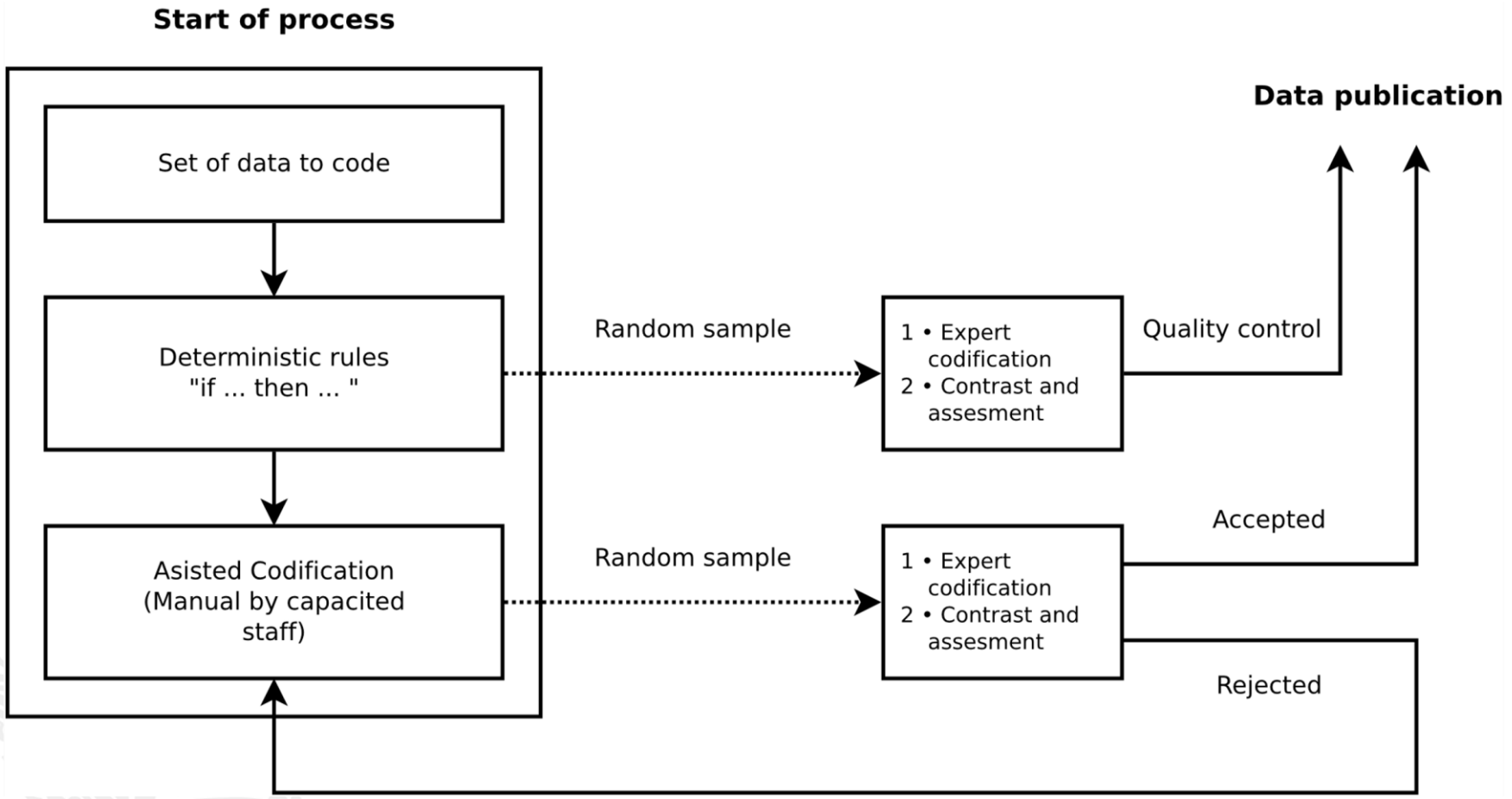
Objectives

- Automate the codification processes of Economic Activity and Occupation.
- Reduce the number of records that are currently manually coded.

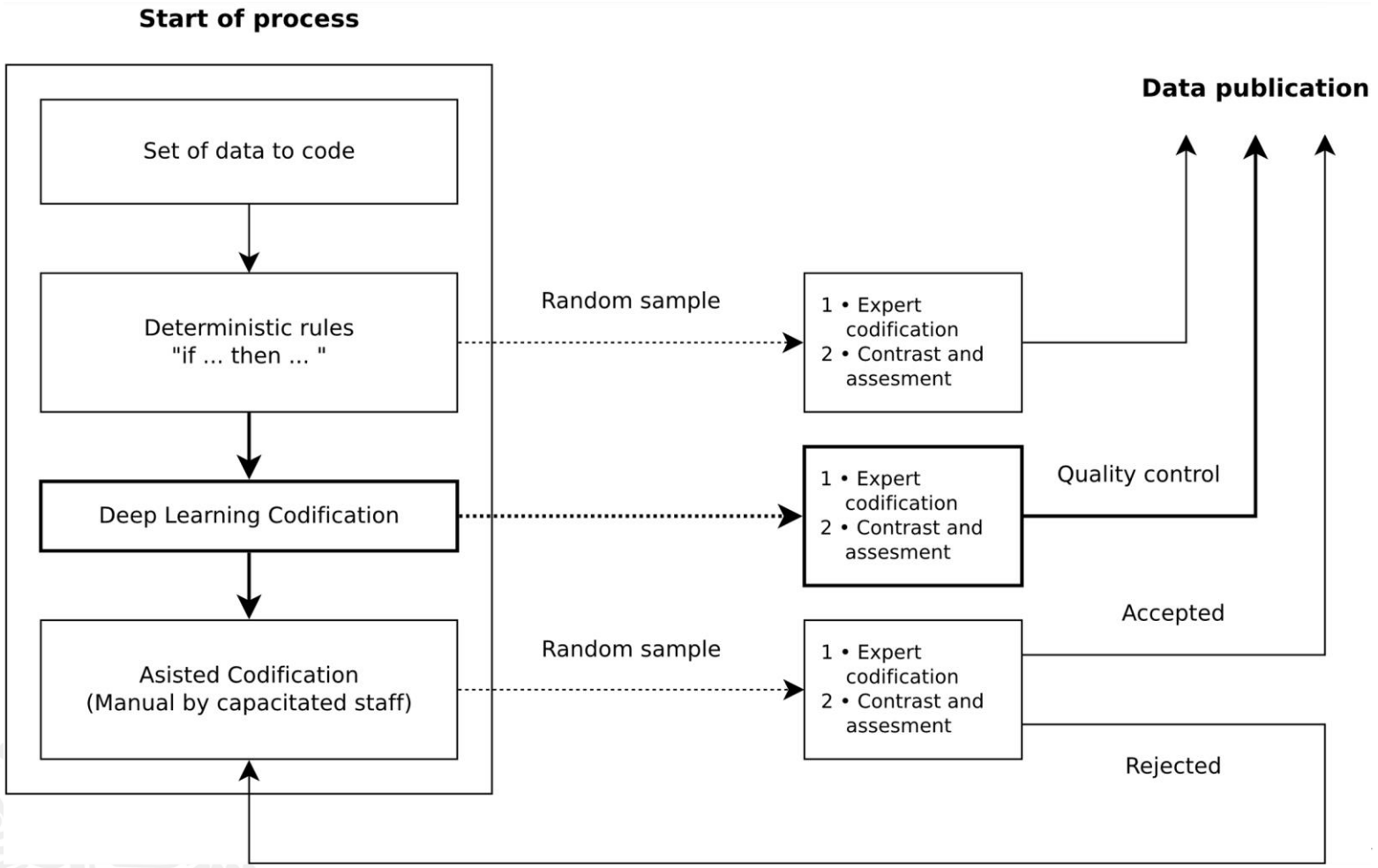
Codification Framework

- **NAICS**: North American Industry Classification System
- **SINCO**: National Occupational Classification System

Current Process

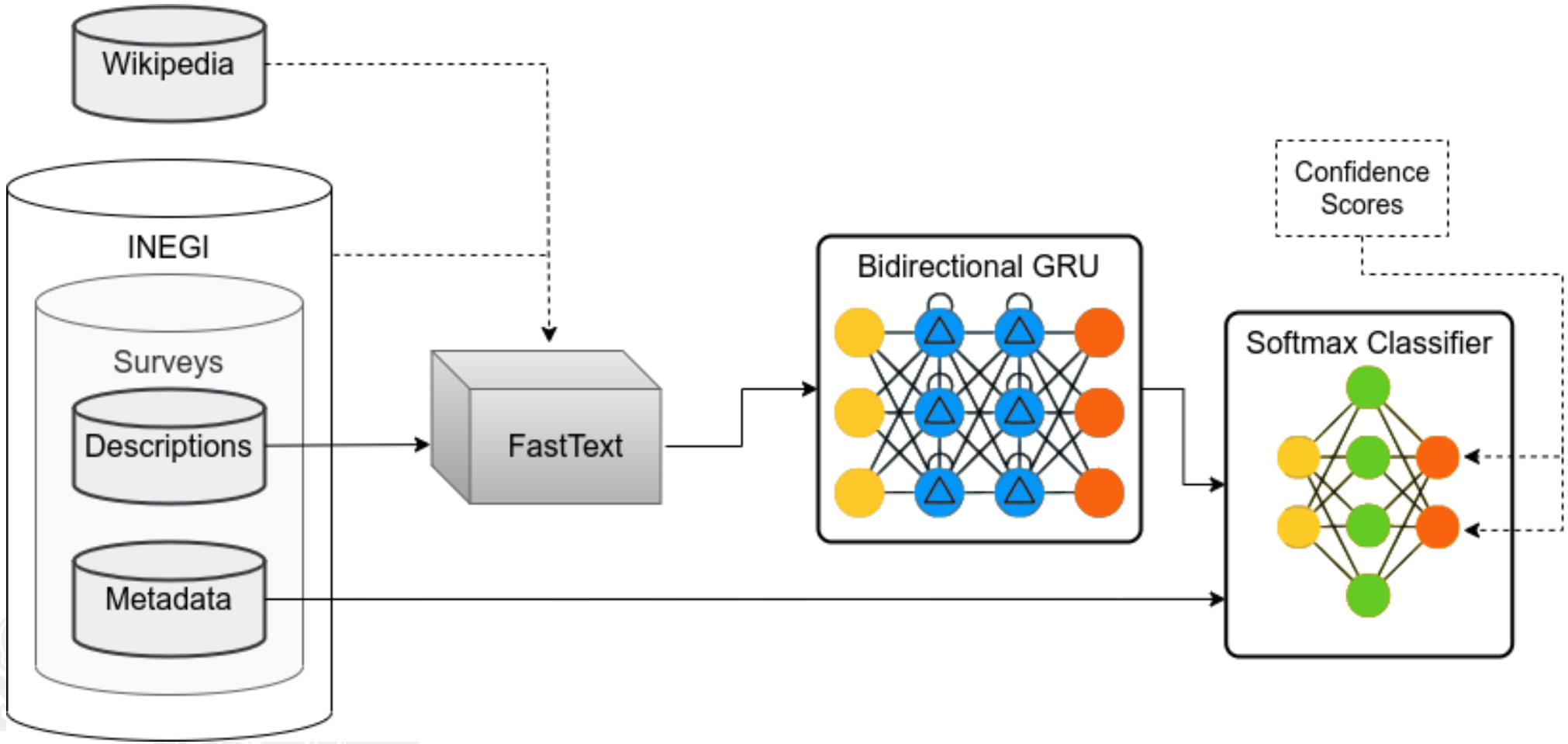


New Process


Start of process
Set of data to code
Deterministic rules
"if ... then ... "
Deep Learning Codification
Asisted Codification
(Manual by capacitated staff)
Random sample
Random sample
1 • Expert codification
2 • Contrast and assesment
1 • Expert codification
2 • Contrast and assesment
1 • Expert codification
2 • Contrast and assesment
Quality control
Data publication
Accepted
Rejected

Production Rates

System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Metadata
FastText
Bidirectional GRU
Confidence Scores
Softmax Classifier

Comparison with Traditional Methods

	TF-IDF + SVM	Bi-GRU no metadata	Bi-GRU
SINCO-Acc	0.5467	0.6299	0.6235
SINCO-F1	0.4043	0.4433	0.4435
SCIAN-Acc	0.6649	0.6979	0.6914
SCIAN-F1	0.4986	0.491	0.4971

DL Threshold

"PREPARACIÓN DE TACOS Y HAMBURGUESAS EN LA VÍA PÚBLICA"

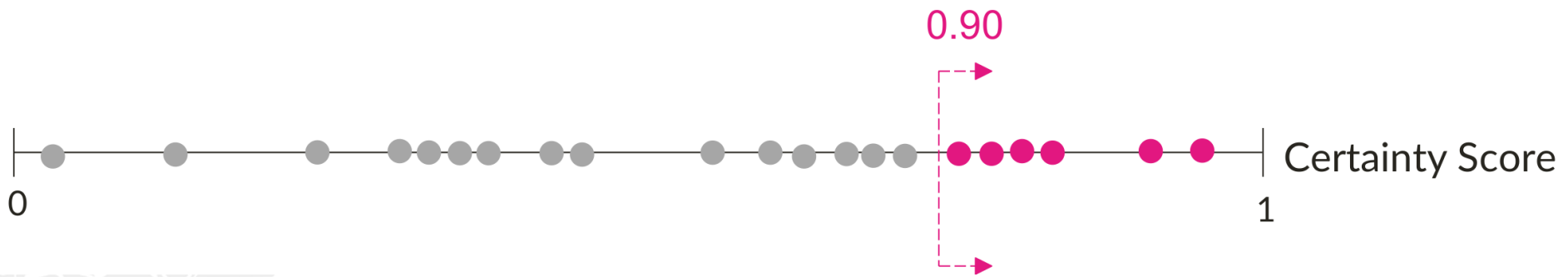
Manual Codification

Code: 7221

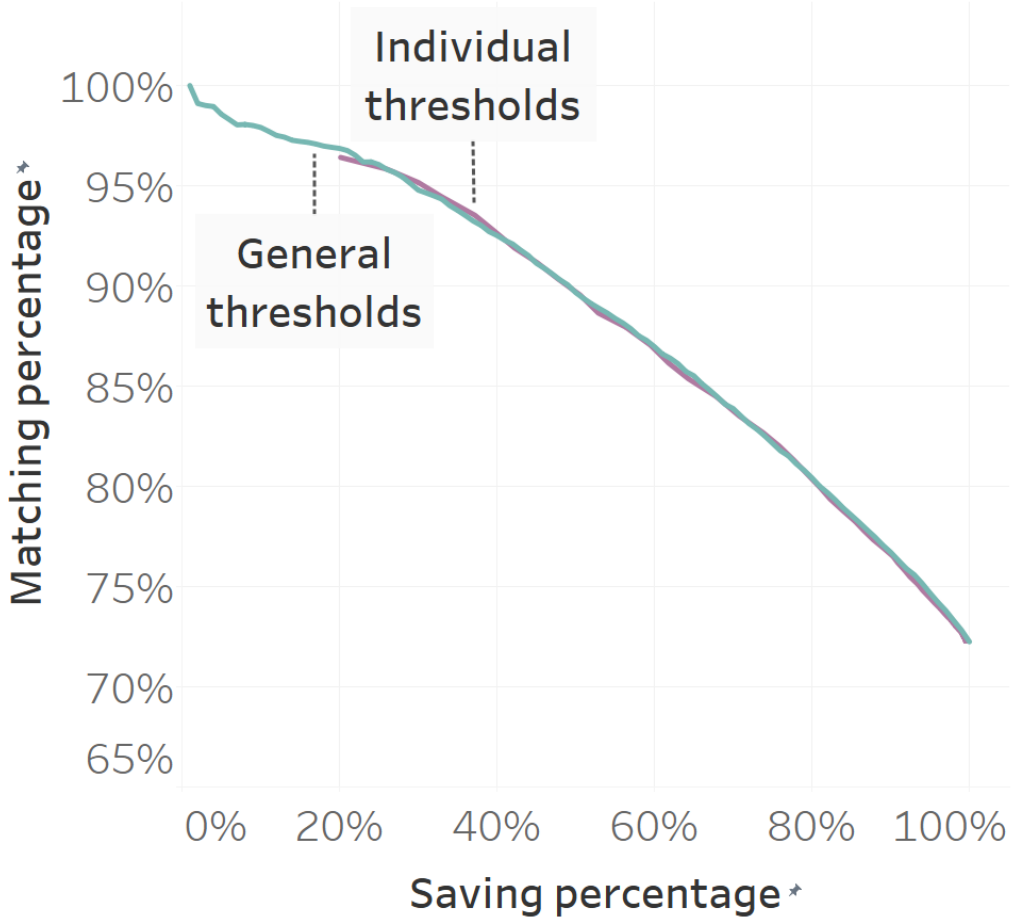
DL Codification

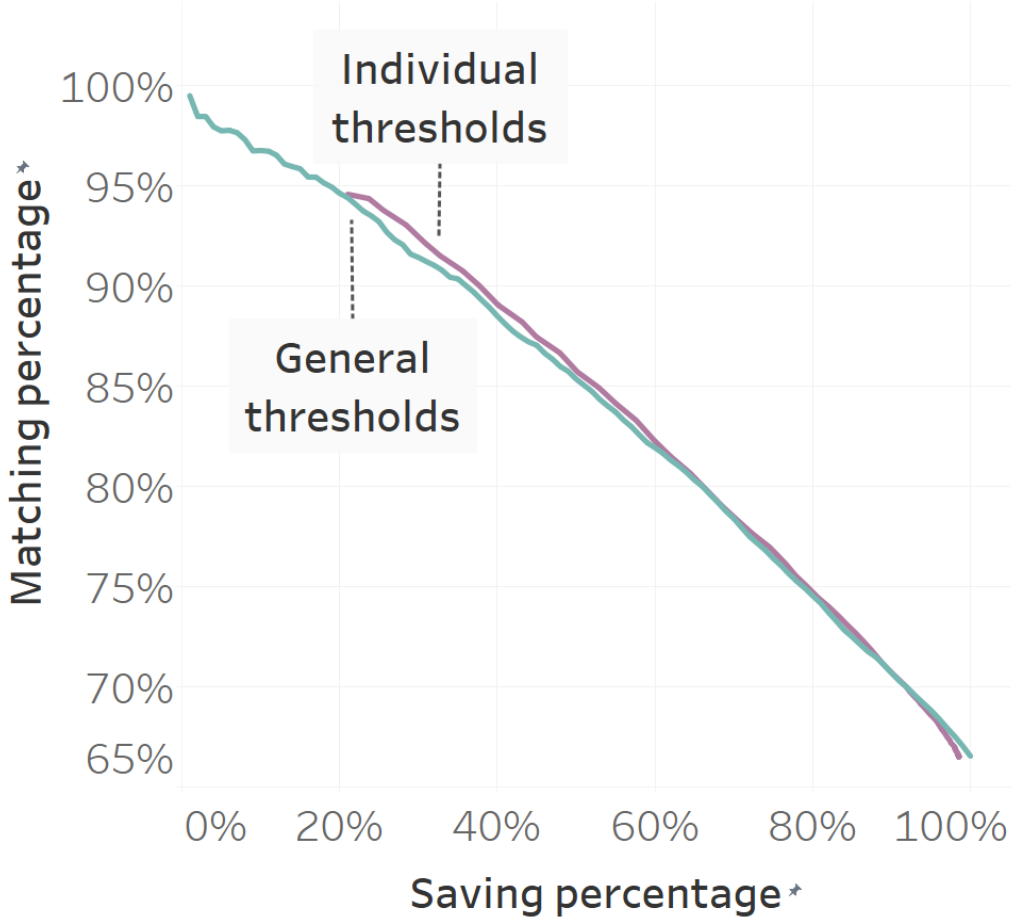
Code: 7221

Certainty: 0.97

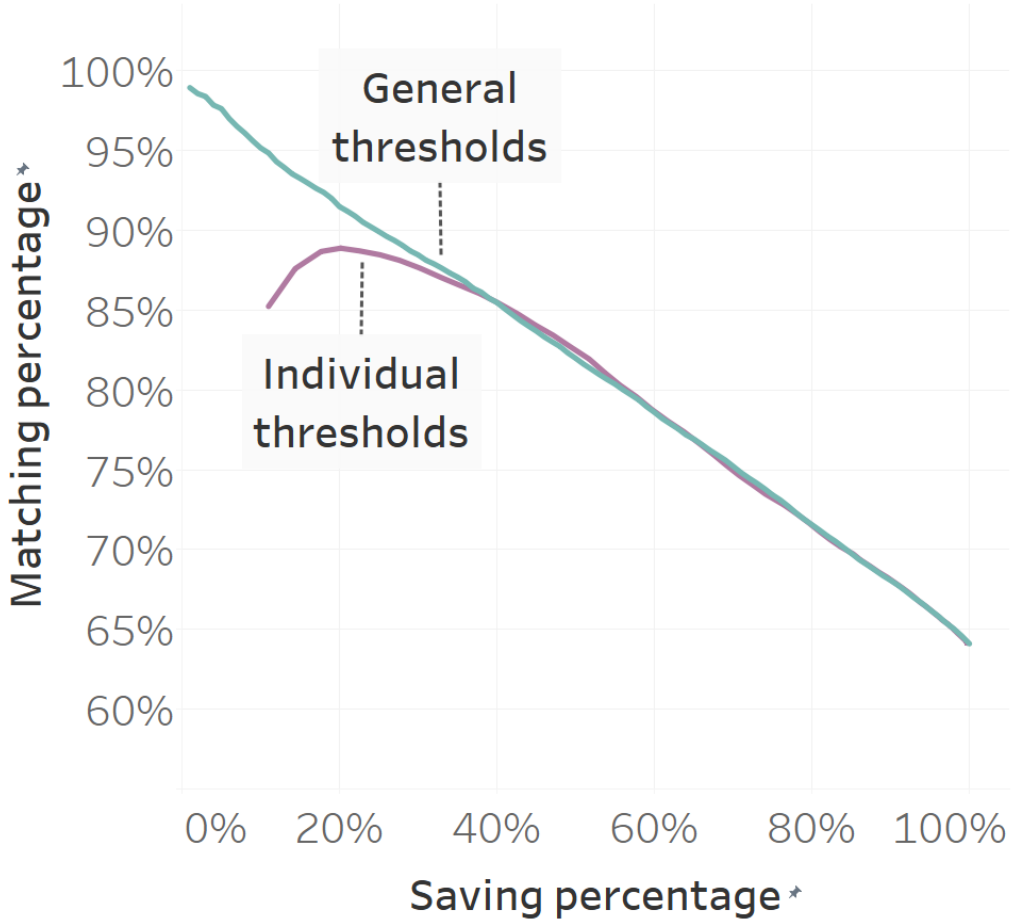


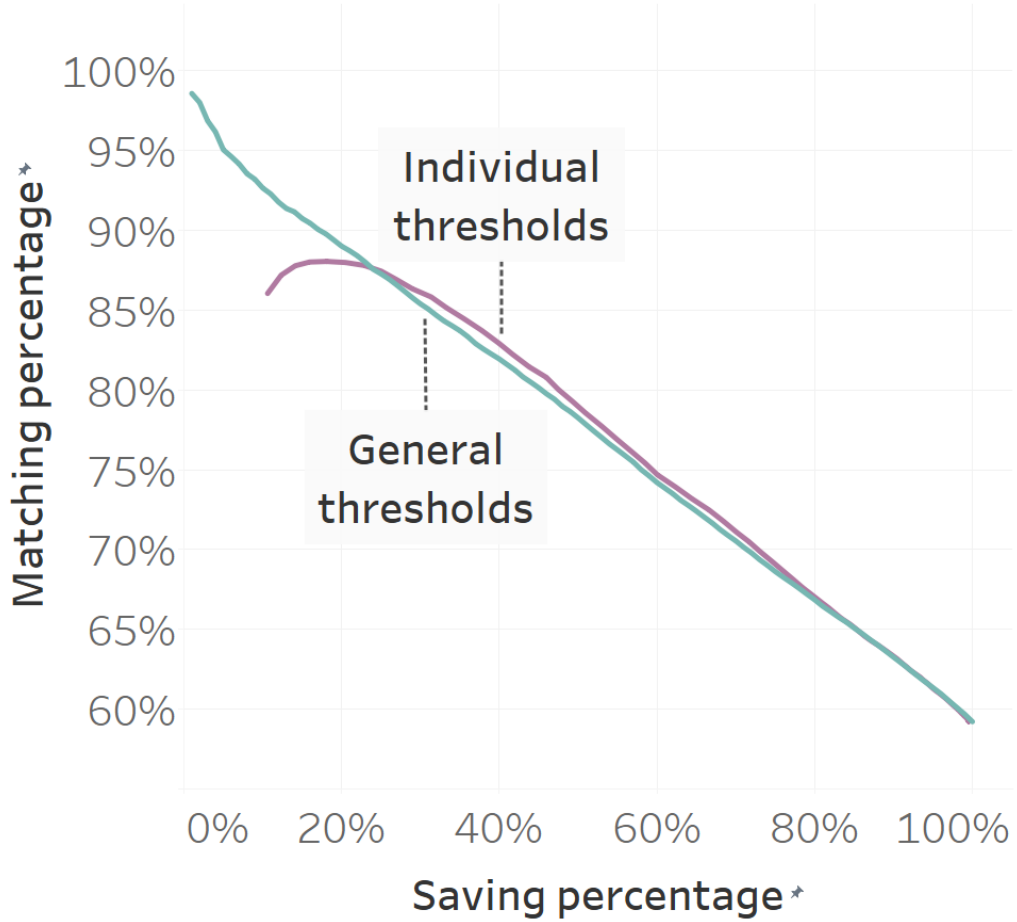
DL Threshold



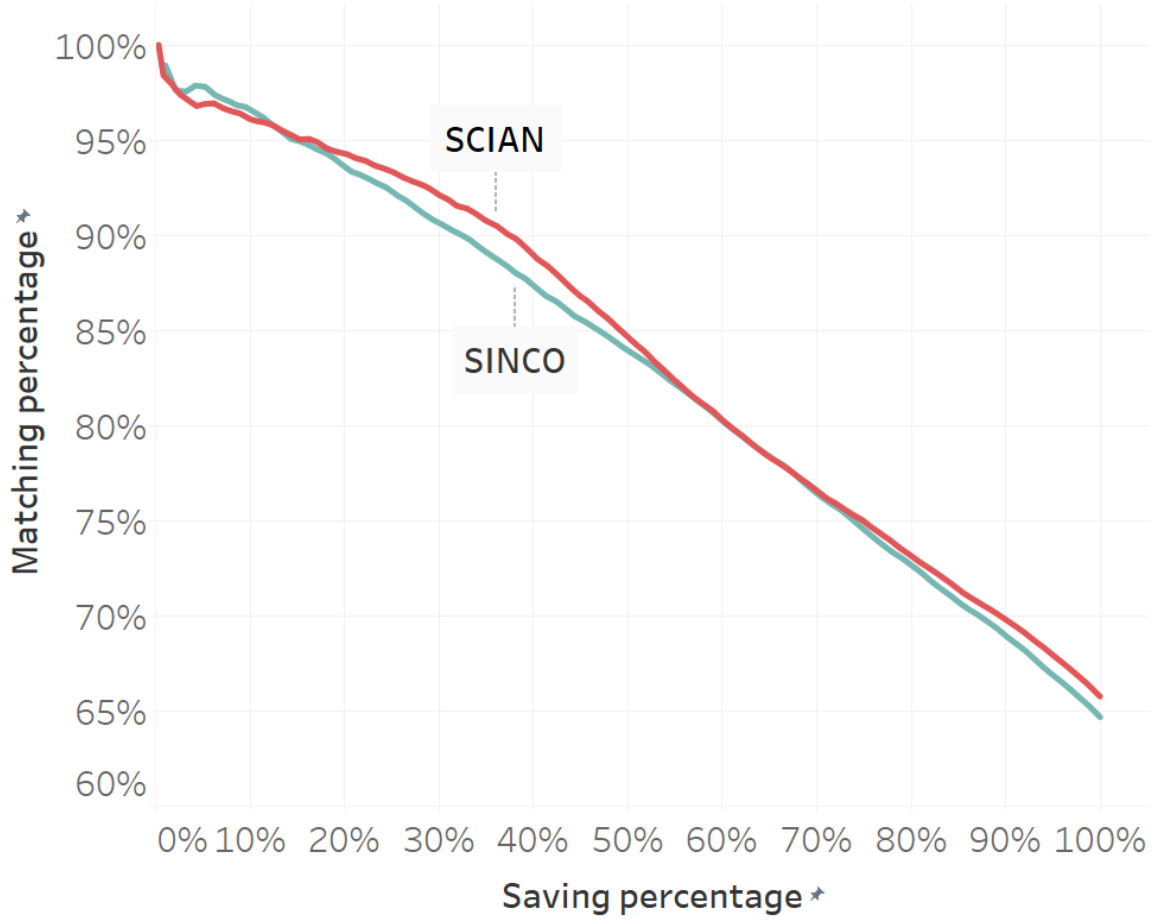


DL Threshold

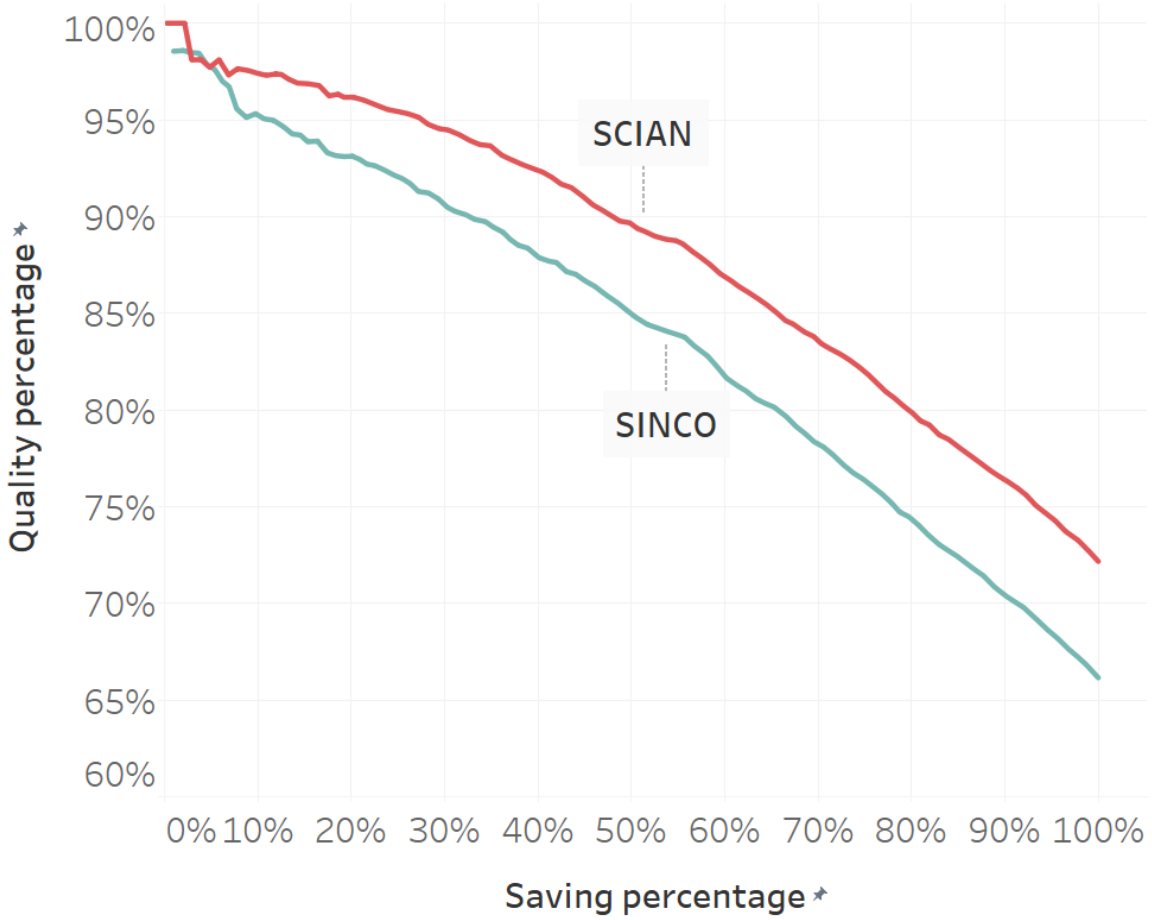




Trade-Off Savings-Matches



Quality Estimation



Occupation Results

Threshold	Val Matching	Val Savings	Matching	Quality	Savings
0.472565	70.7%	90.0%	69.4%	70.8%	88.9%
0.586216	74.5%	80.0%	73.0%	74.7%	78.7%
0.705673	78.4%	70.0%	77.0%	78.8%	68.6%
0.808395	81.9%	60.0%	80.9%	82.8%	58.2%
0.889082	**85.4%**	**50.0%**	**84.5%**	**85.9%**	**47.4%**
0.943088	88.5%	40.0%	88.0%	88.8%	37.0%
0.973509	91.4%	30.0%	91.1%	91.3%	27.2%
0.989804	94.6%	20.0%	94.0%	93.2%	18.3%
0.997738	96.8%	10.0%	96.7%	95.1%	8.8%

Economic Activity Results

Threshold	Val Matching	Val Savings	Matching	Quality	Savings
0.534222	76.7%	90.0%	70.3%	76.6%	89.3%
0.67707	80.4%	80.0%	73.9%	80.2%	79.2%
0.793442	83.9%	70.0%	77.3%	83.8%	69.5%
0.881765	87.0%	60.0%	81.2%	87.1%	59.5%
0.936173	**89.7%**	**50.0%**	**85.6%**	**89.7%**	**49.8%**
0.970834	92.5%	40.0%	90.1%	92.4%	39.7%
0.988363	94.8%	30.0%	92.8%	94.8%	28.2%
0.996108	96.9%	20.0%	94.9%	96.2%	17.6%
0.999112	97.9%	10.0%	96.5%	97.6%	7.8%

Conclusion

- The methodological proposals can be used for the partial replacement of the assisted coding process by automatic coding using Artificial Intelligence
- According to our estimations, it would be possible to encode with DL 50% of the records that are currently encoded manually, maintaining the same quality standards.
- One of the main advantages of using algorithms is that they will always apply the same criterion to code, resulting in greater consistency.
- Thanks to the savings from artificial intelligence, efforts can be concentrated on the more complex records and classes, thus ensuring continuous improvement in the quality of the entire system over time.

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Thank you

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