The Effectiveness of the School Feeding Project (SFP) on Cognitive Power of Primary School Children in Egypt

قياس تأثير مشروع التغذية المدرسية على التحصيل الدراسى على تلاميذ المرحلة الابتدائية في مصر

Presented by

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&

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Acknowledgment

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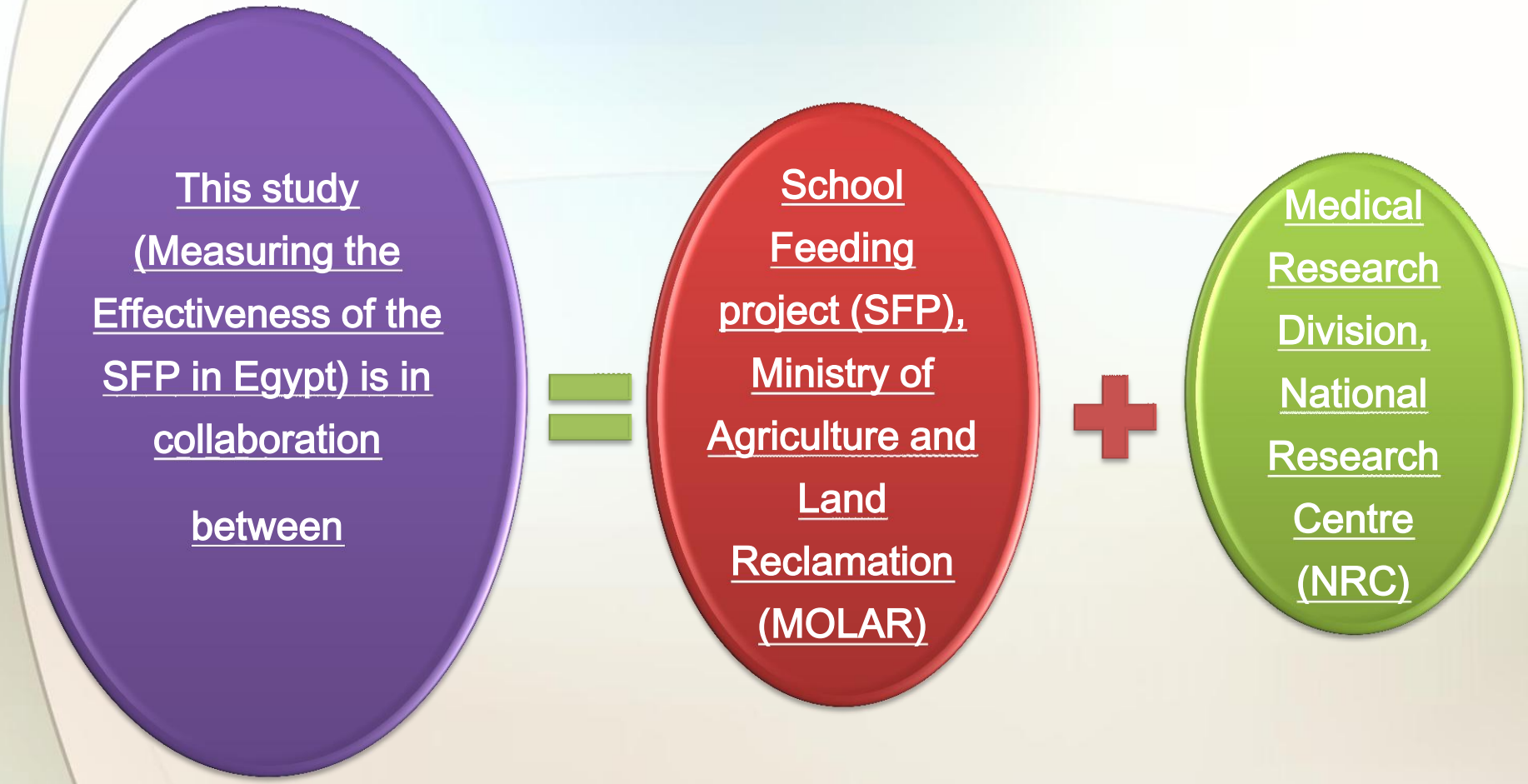
- Also our sincere thanks and appreciation to Eng. Saad Al-Ansary Executive Director of SFP and Dr. Ahmed Morad Technical Director of the project for their help in facilitating the field work and data collection during the study


This study (Measuring the Effectiveness of the SFP in Egypt) is in collaboration between
School Feeding project (SFP), Ministry of Agriculture and Land Reclamation (MOLAR)
Medical Research Division, National Research Centre (NRC)

Supervision Team Work

- **Prof. Dr: Nabih Abd El- Hamid Ibrahim Director of Egyptian Food Safety Information Center & Technical Supervisor of the SFP& MCCEDP , (MOLAR).**
- **Prof. Dr. Abla Galal Professor and Head of Child Health department, Head of Developmental & Behavioral Pediatrics Clinic , (NRC).**
- **Prof. Dr. Ammal Mokhtar Research Professor of Public Health, Preventive and Community Medicine and Chairman of Project Formulation Committee, (NRC).**

Introduction

Introduction

Nutritional and health status are powerful influences on a child's learning and on how well a child performs in school. Children who lack certain nutrients in their diet (particularly iron, zinc and iodine), or who suffer from protein-energy malnutrition, hunger, parasitic infections or other diseases, do not have the same potential for learning as healthy and well-nourished children.

Nutrition status of Egyptian school children

- Malnutrition disorders affect more than 30% of school children in Egypt.
- Iron deficiency anemia is the most common nutritional disorder.
- Subclinical vitamin A deficiencies and other micronutrient deficiencies are also present.
- Weak health and poor nutrition among school-age children diminish their cognitive development either through physiological changes or by reducing their ability to participate in learning experiences - or both.

SO WHAT IS

The potential contribution to improve nutritional status, cognitive and academic performance ?

The potential contribution is

IS SFP

Effective in upgrading the nutritional status of the primary school students through its impact on education participation and attainment, learning, cognitive development?

It is important to measure the effectiveness of

How?

Objectives

General Objective:

The general aim of this study was to measure the Effectiveness of the School Feeding Project (SFP) on Cognitive Power of Primary School Children in Egypt

Specific Objectives:

The specific aim of this study was to look for evidence that the intervention had an impact that the nutritional status of primary school children have improved as a direct result of having the served meals over time with special emphasis on:

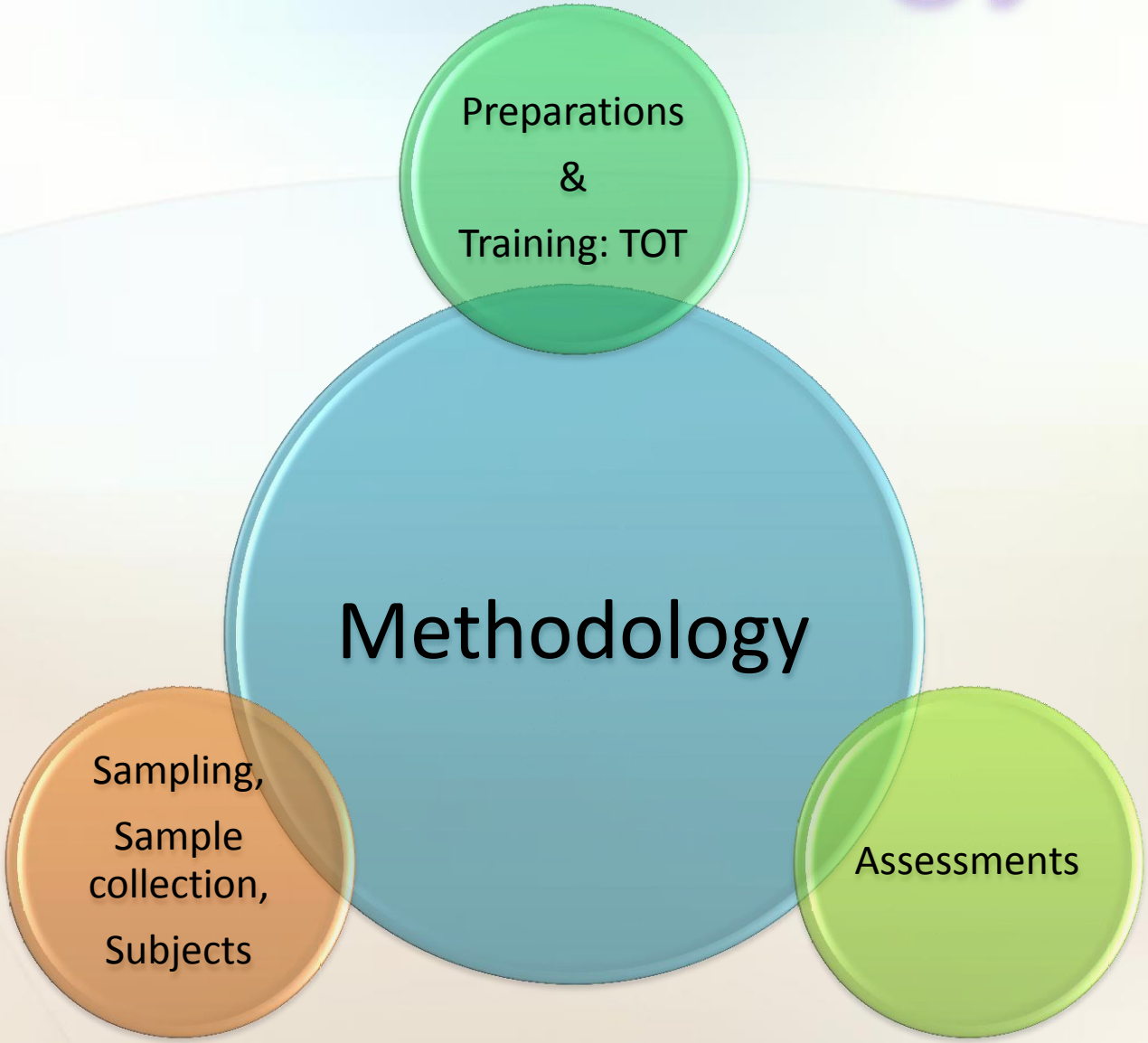
a) Cognitive function (Development of behavior and emotion, punctuality, student behavior

b) Attentiveness, academic and day performance,

c) Physical Growth.

Methodology

Methodology



Sampling

Governorates

- Fayoum
- Damietta
- Behara

Students

- Students having meal (903 students)
- Students not having meal (886 students)

Subjects

- 5^{th}. grade students (30 clusters/ each frame)

Theoretical and Practical Training

TOT for **supervisors & field implementers**

Training **field implementers** again followed by refresher practical course before the field implementation of the survey

Office training for the **supervisors** theoretical & practical on scoring the behavioral assessment tests

Practical field training for the **supervisors** for ensuring reliability related to behavioral assessment tests.

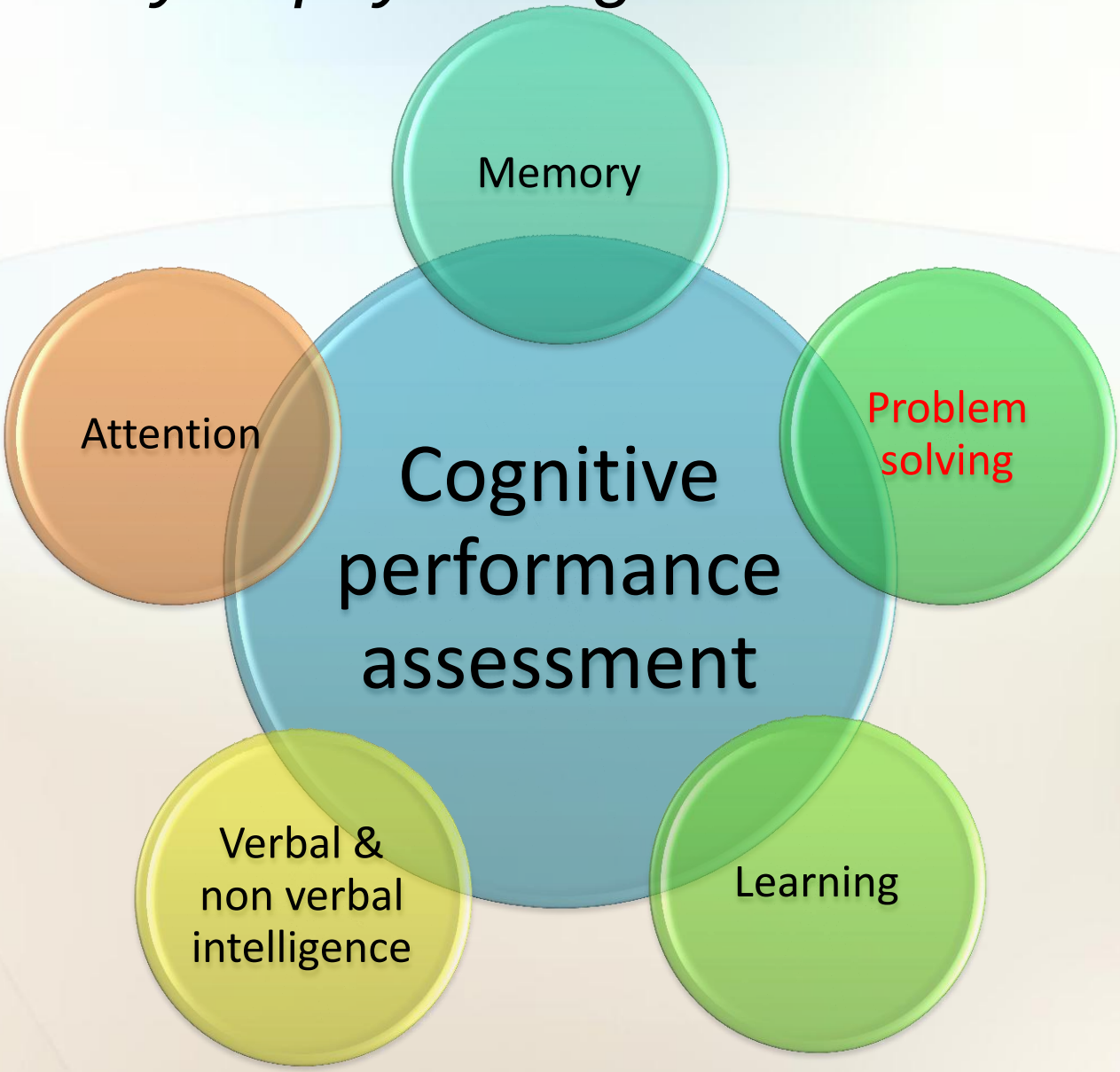
Piloting the assessment questionnaires

Pilot study for three different clusters was carried out in Fayoum, Damietta and Behara governorates (one cluster for each) before carrying out the questionnaire

Assessments

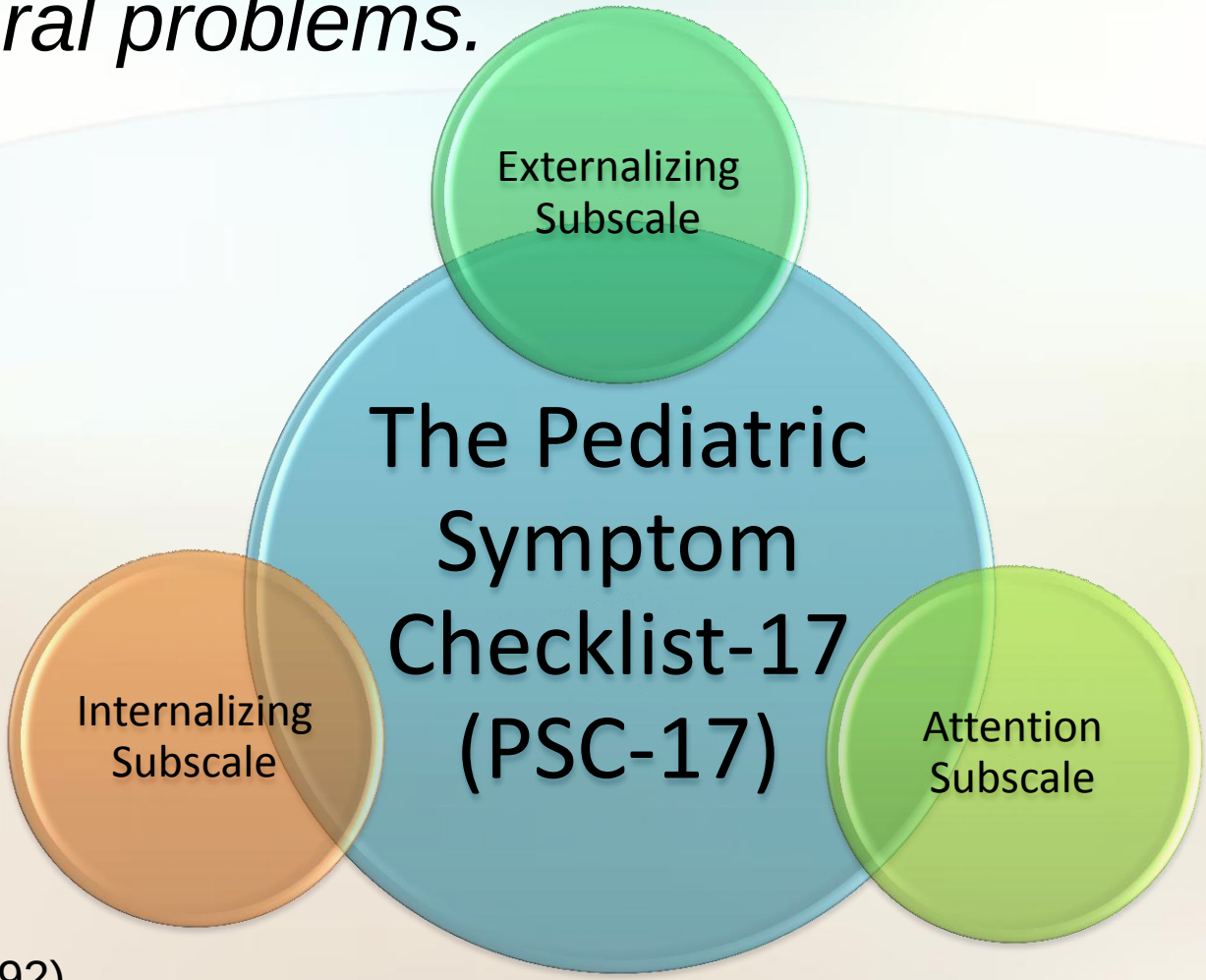
Cognitive performance assessment

- *A battery of psychological tests that covers:*



Behavioral Assessment

- *A psychosocial screen designed to facilitate the recognition of cognitive, emotional, and behavioral problems.*



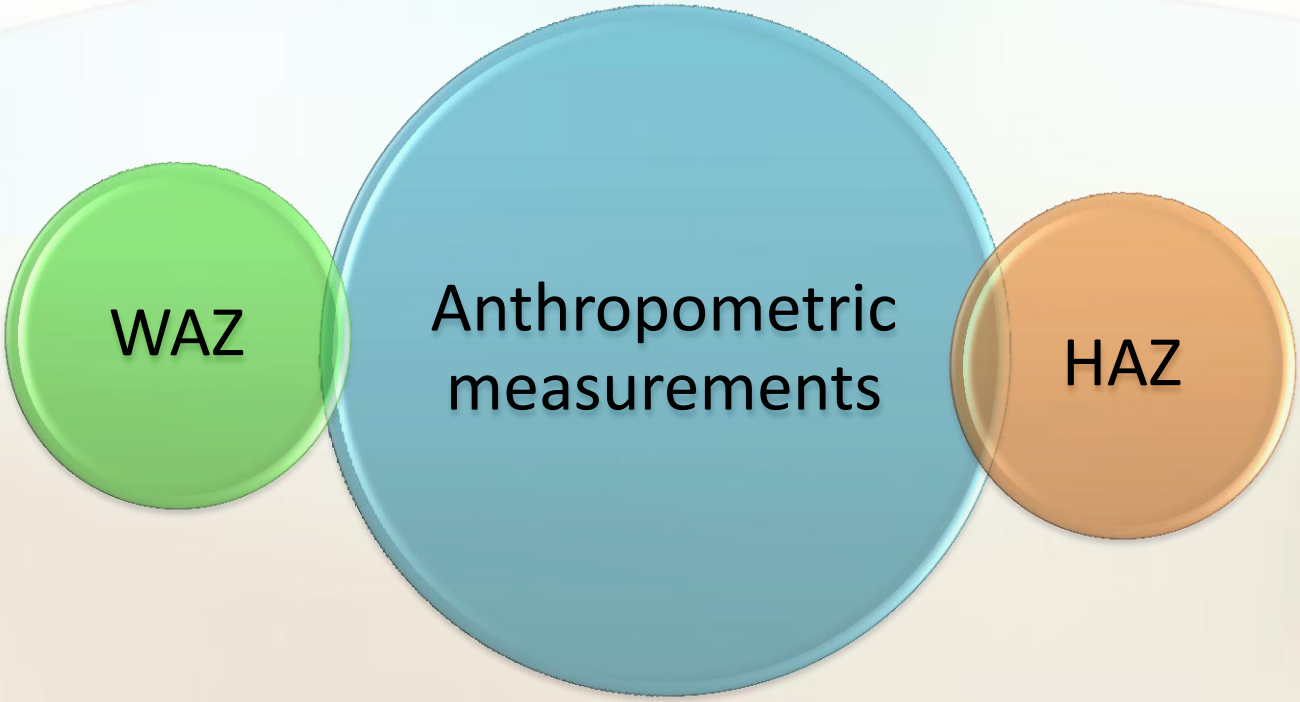
(Ismaeel ,1992)

Learning Achievement

the mean score of monthly tests and midyear test scores.

Nutritional Status Assessment

- *Measurements of weight and height*



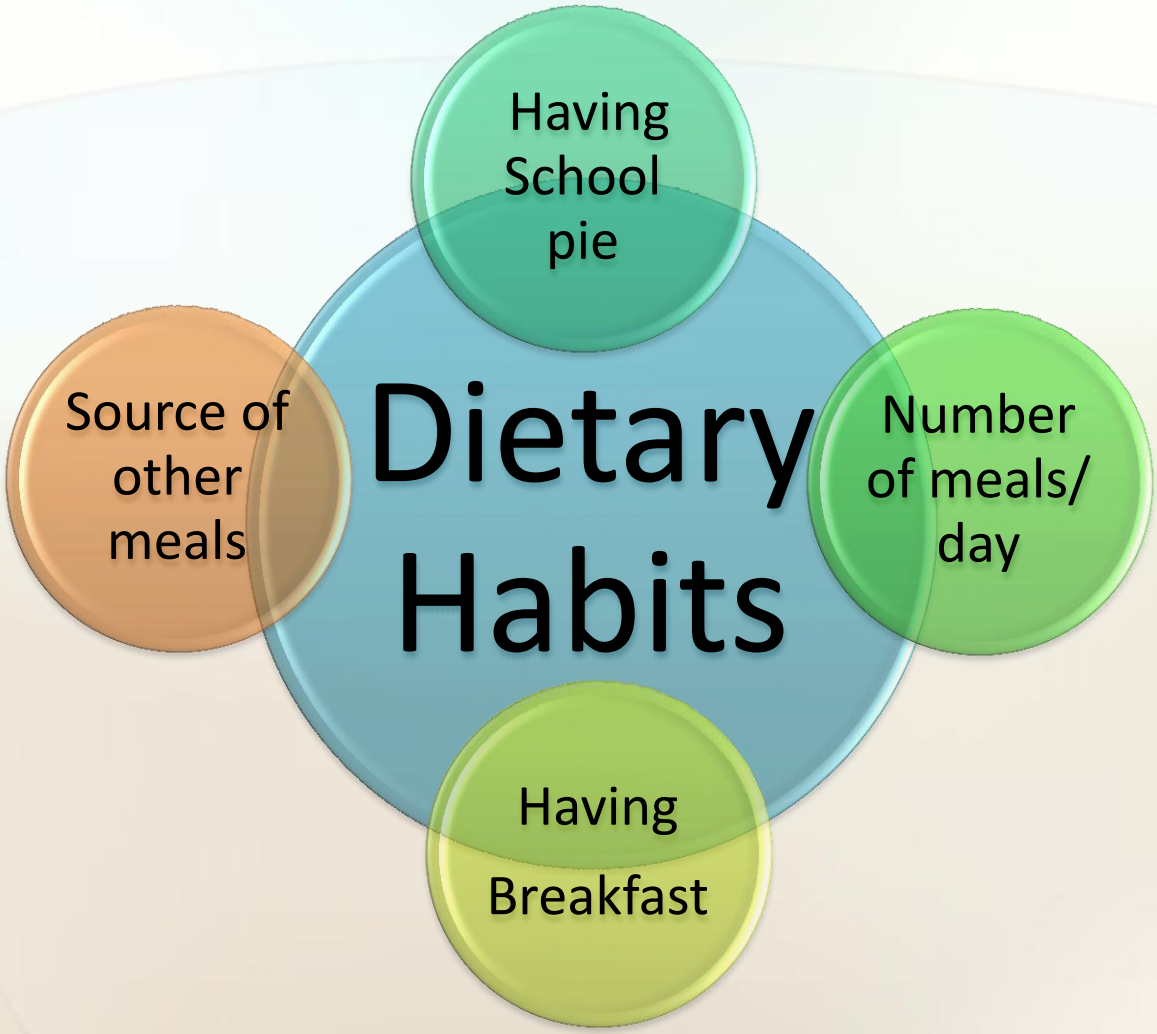
Measuring child's growth (Anthropometry).

The child's age, sex, and measurements of weight and length or height were used to calculate the following growth indicators,

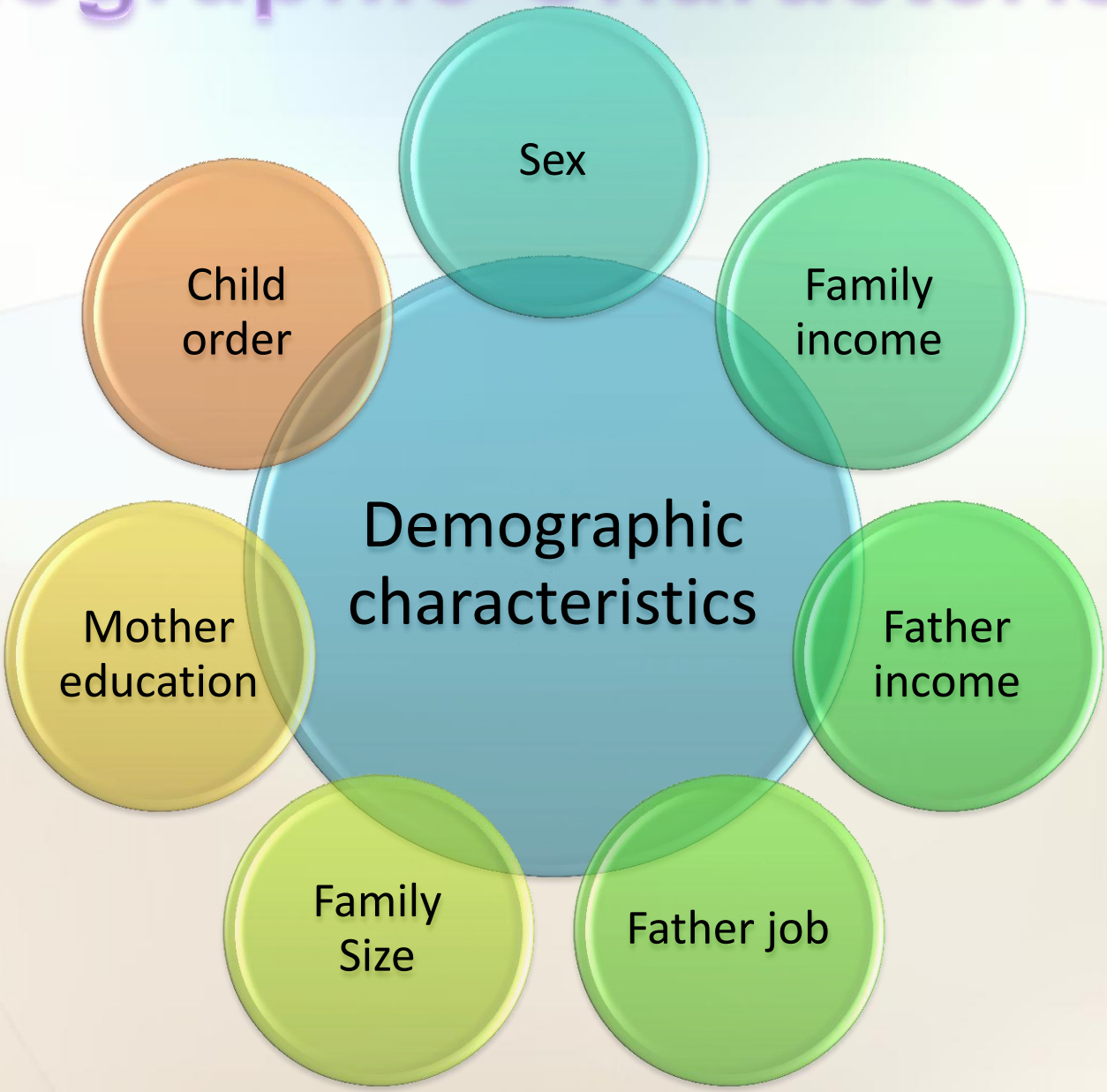
weight-for-age
length/height-for- age

Dietary Habits

•Qualitative information about the different items of food and beverage consumed by children .



Demographic Characteristics



Table(1):Ingredients of the school meal (pie)

Ingredients	Percentage
Wheat Flour	42.70
water	18.82
Jam or date	17.08
Fat (margarine and butter)	8.54
Eggs	5.00
Sugar	4.27
Milk (skimmed dry)	1.71
Sesame	0.85
Yeast	0.77
Salt	0.17
Vanilla	0.09

Table(2):Ingredients of the school meal (pie) by weight

Ingredients	weight
Wheat Flour	50 kg
water	19L
Jam or date	25/30kg
shortening	7kg
Eggs	90 eggs
Sugar	7kg
Milk (skimmed dry)	1kg
Yeast	900g
Salt	200g
Vanilla	300g(10%)
oil	1 kg

Table(3):Ingredients of the new product with long shelf life (biscuits) by weight

Ingredients	weight
Wheat Flour	50 kg
water	8L
Jam or date	25/30kg
shortening	14kg
Eggs	90 eggs
Sugar	7kg
Milk (skimmed dry)	1kg
Yeast	900g
Salt	200g
Vanilla	300g(10%)
oil	1 kg
Sod.bicarbonate	500g

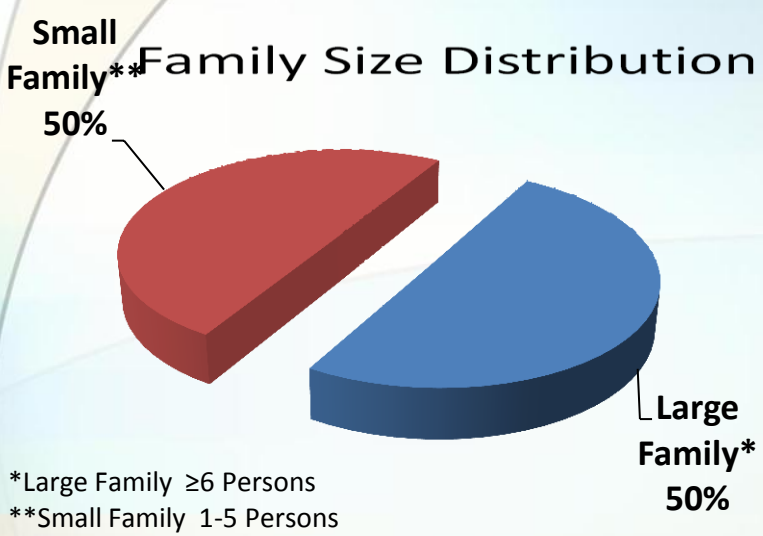
Table(4): Nutritional facts of the school meal (pie) according to RDA

composition	RDA	Pie	%RDA
Energy (Kcal)	2000	338.067	16.90
Protein (GM)	28	7.506	26.81
Vit A(IU)	3300	332.629	10.08
Vit C(MG)	45	1.923	4.27
Thiamin(MG)	1	0.094	9.40
Riboflavin (MG)	1.2	0.141	11.75
Vit B6 (MG)	1.2	0.053	4.42
Folate(MCG)	100	41.762	41.76
Niacin (MG)	13	1.03	7.92
Vit B12 (MCG)	1.4	0.122	8.71
Calcium (MG)	800	44.477	5.56
Zinc(MG)	10	0.692	6.92
Iron(MG)	10	3.588	35.88
Phosphorus (MG)	800	109.138	13.64

Results

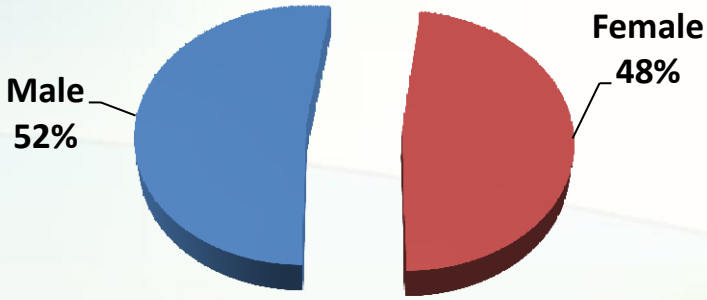
Demographic Characteristics Of Studied Children

Family Size Distribution

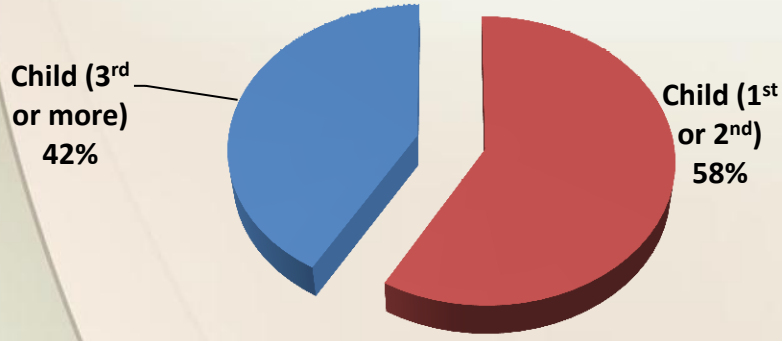


*Large Family ≥6 Persons
**Small Family 1-5 Persons

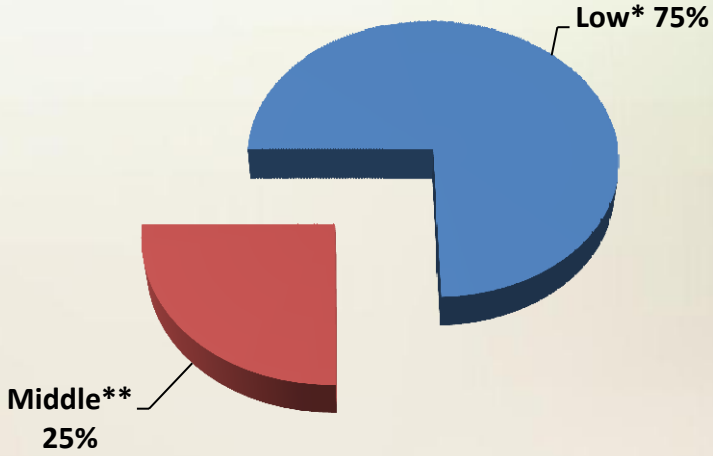
Sex Distribution



Child Order Distribution

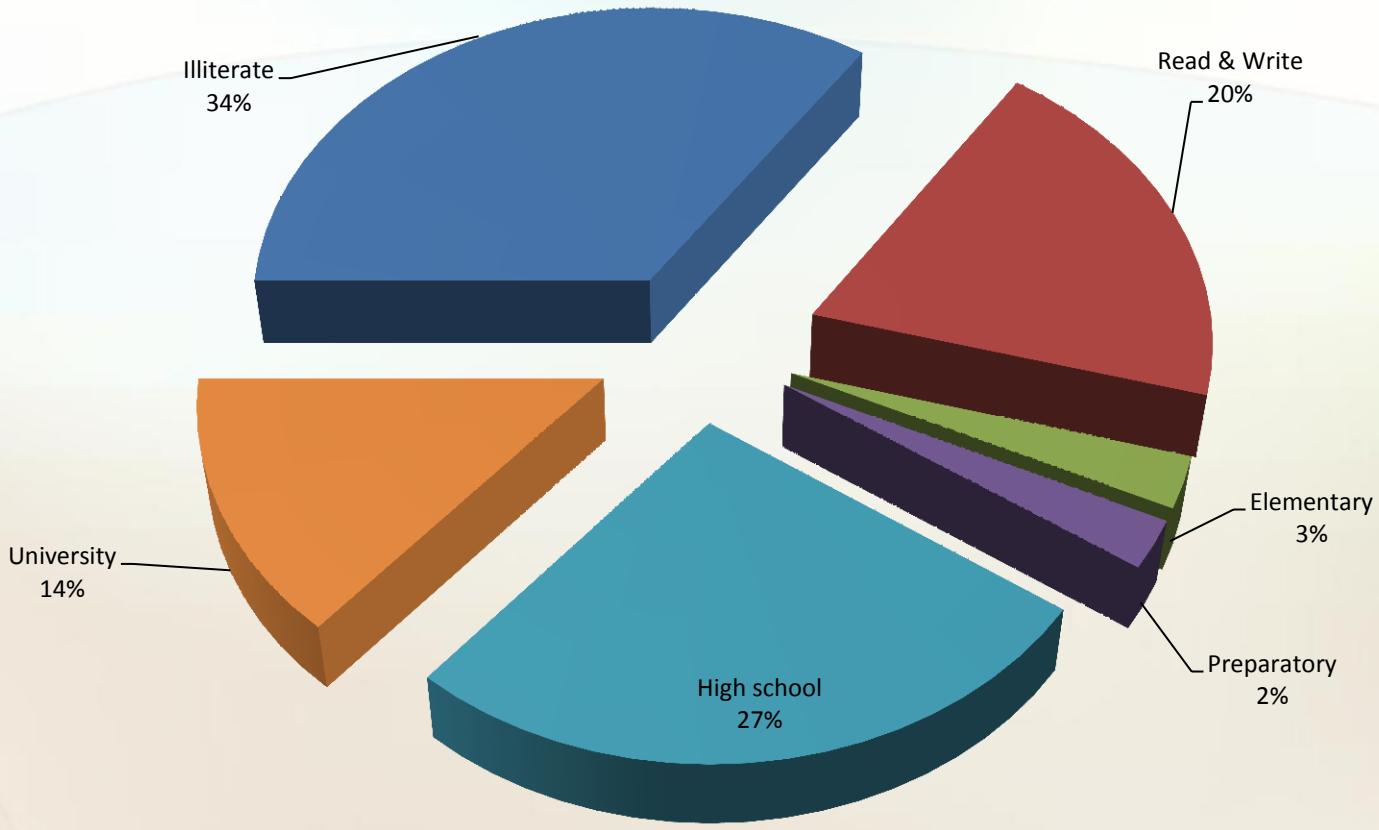


Family Income Distribution

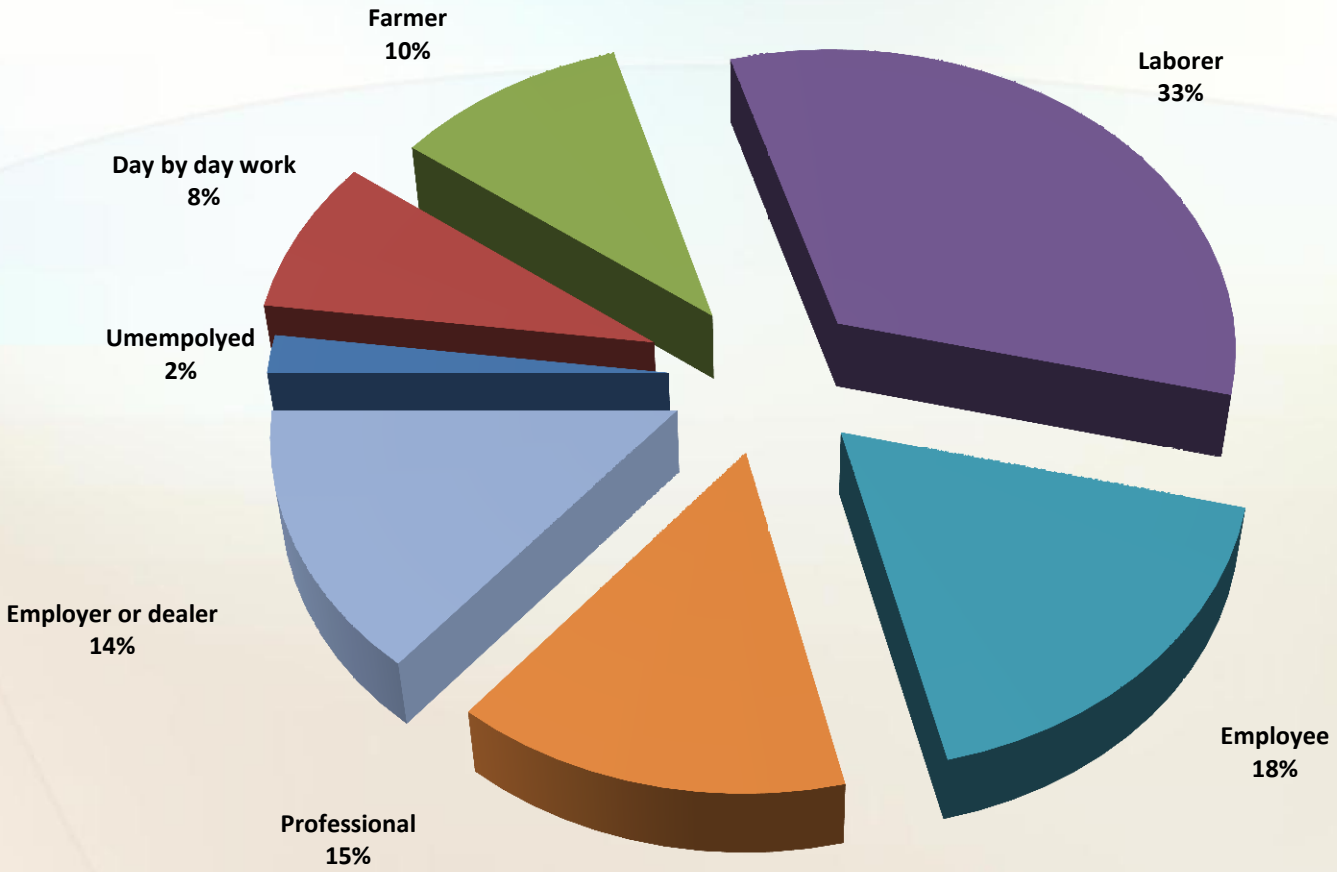


*Low-income families: both parents were unemployed, day-to day worker, labor, farmer, etc.

Mother Education Distribution

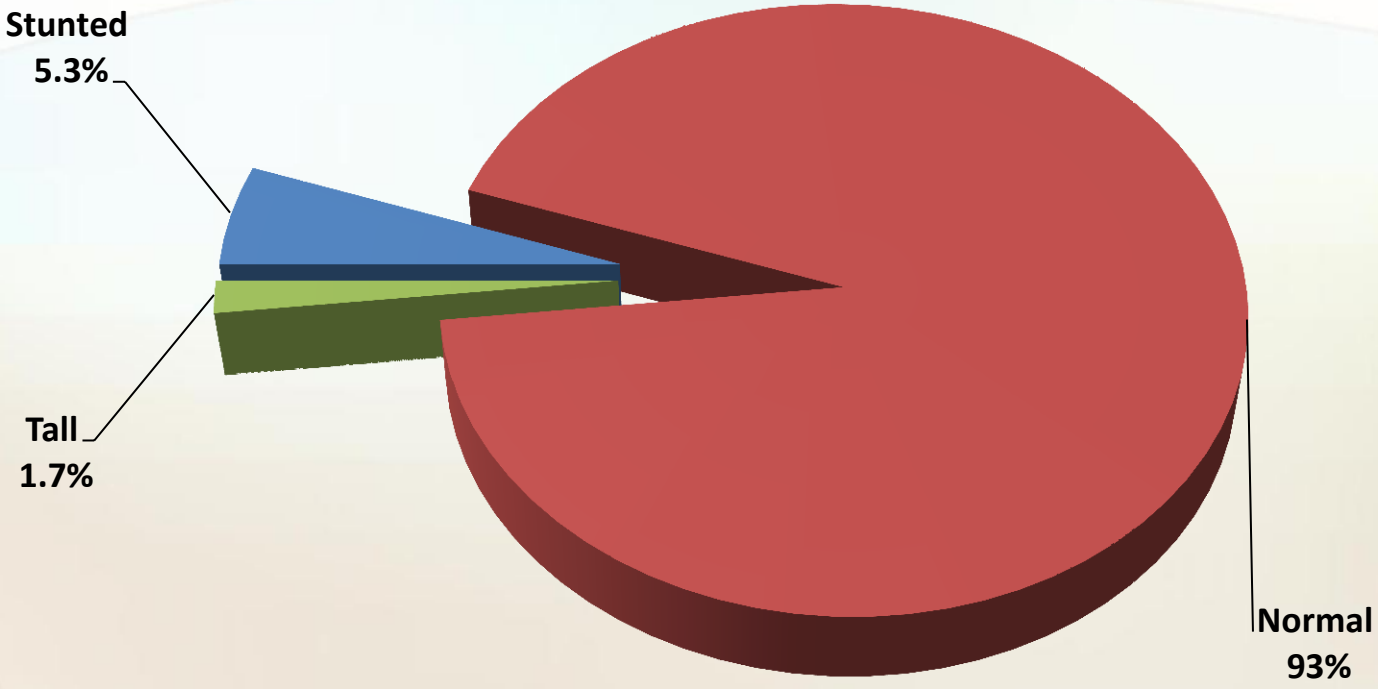


Father Job Distribution.



Physical Characteristics Of Studied Children

HAZ* Distribution of Sample

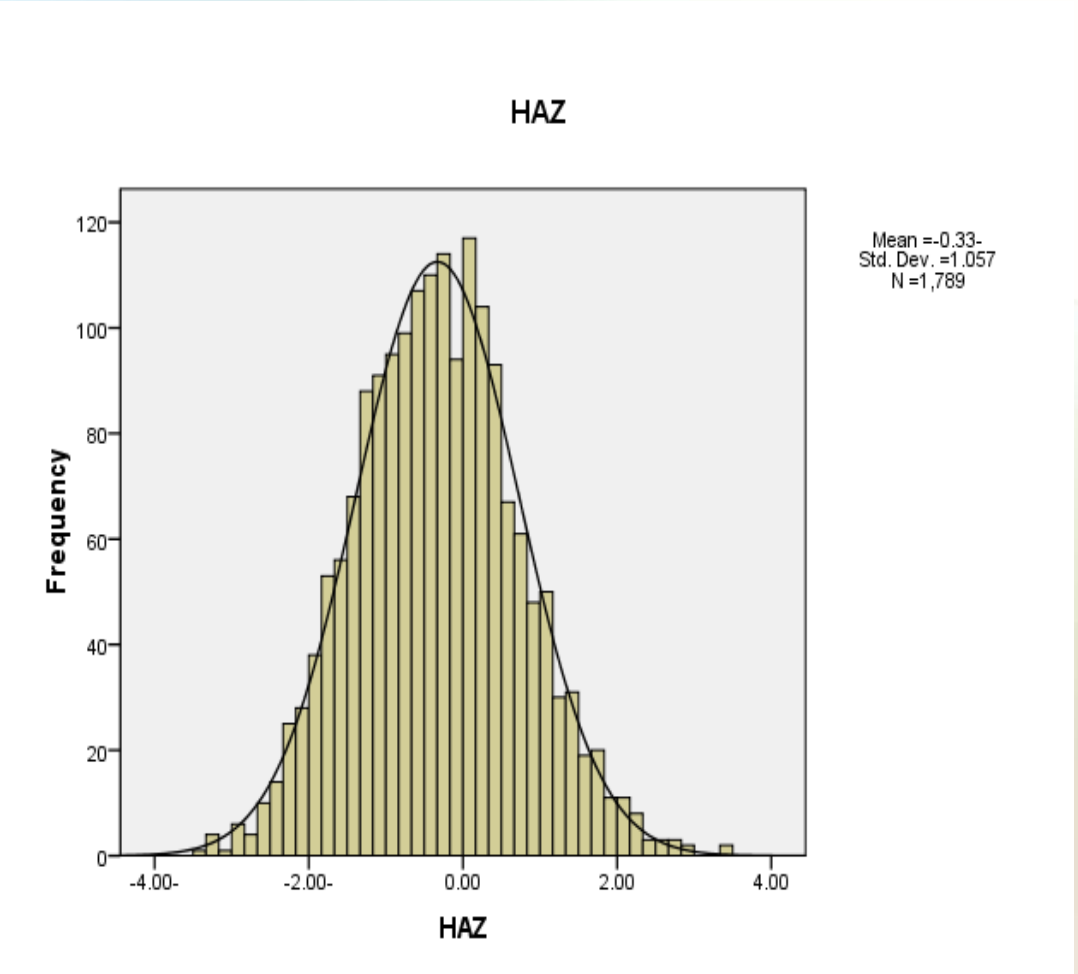


*HAZ= Height /Age Z-Score

Frequency Distribution Curve of HAZ*

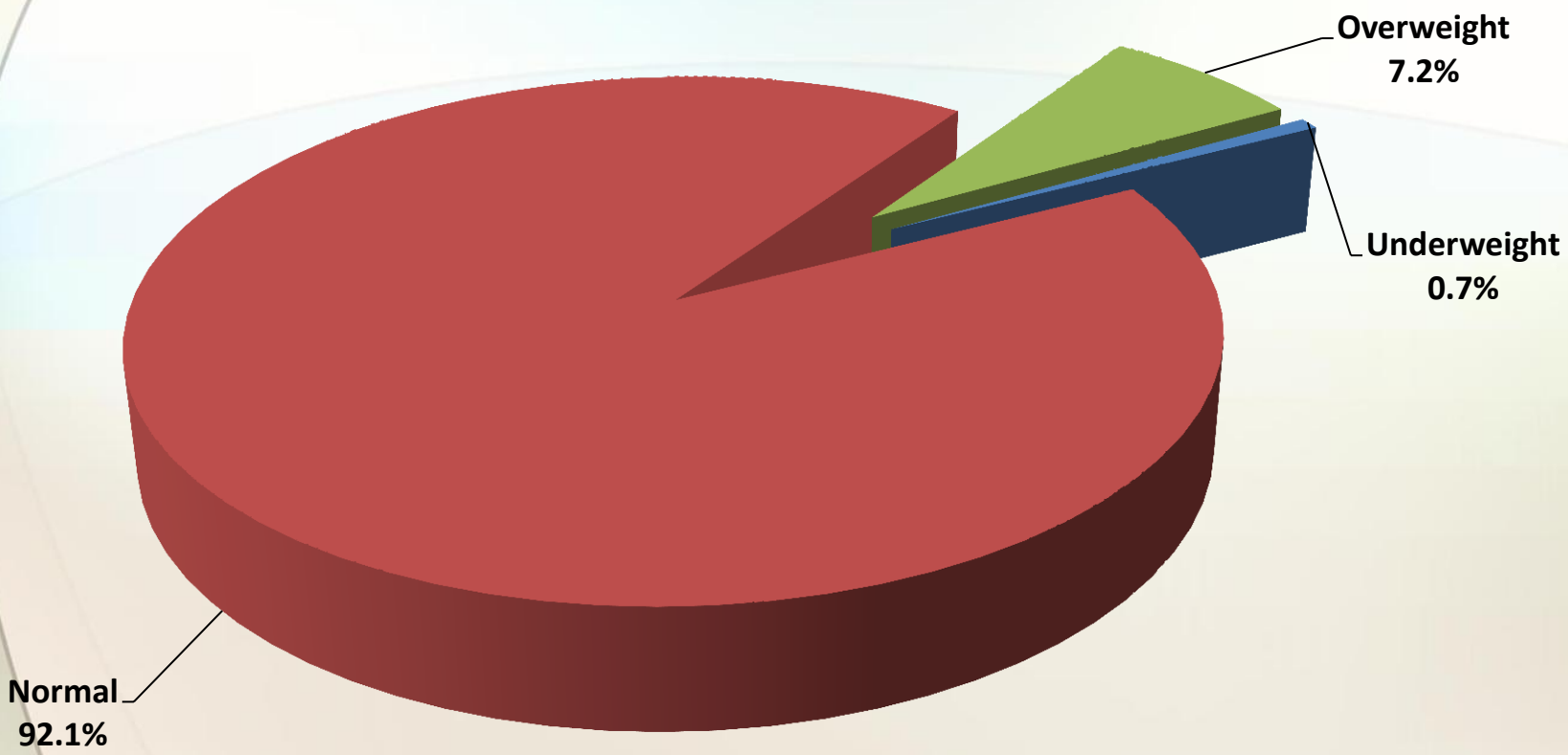
- The mean height was slightly less than the standard height for their age
- Slight shift of the curve to the left.

*HAZ= Height /Age Z-Score



- In our study, a small percentage (5.3%) of stunted children were found in the sample.
- Height gain was found to be more affected by the micronutrient content of foods rather than by the quantity consumed.

WAZ Distribution of Sample

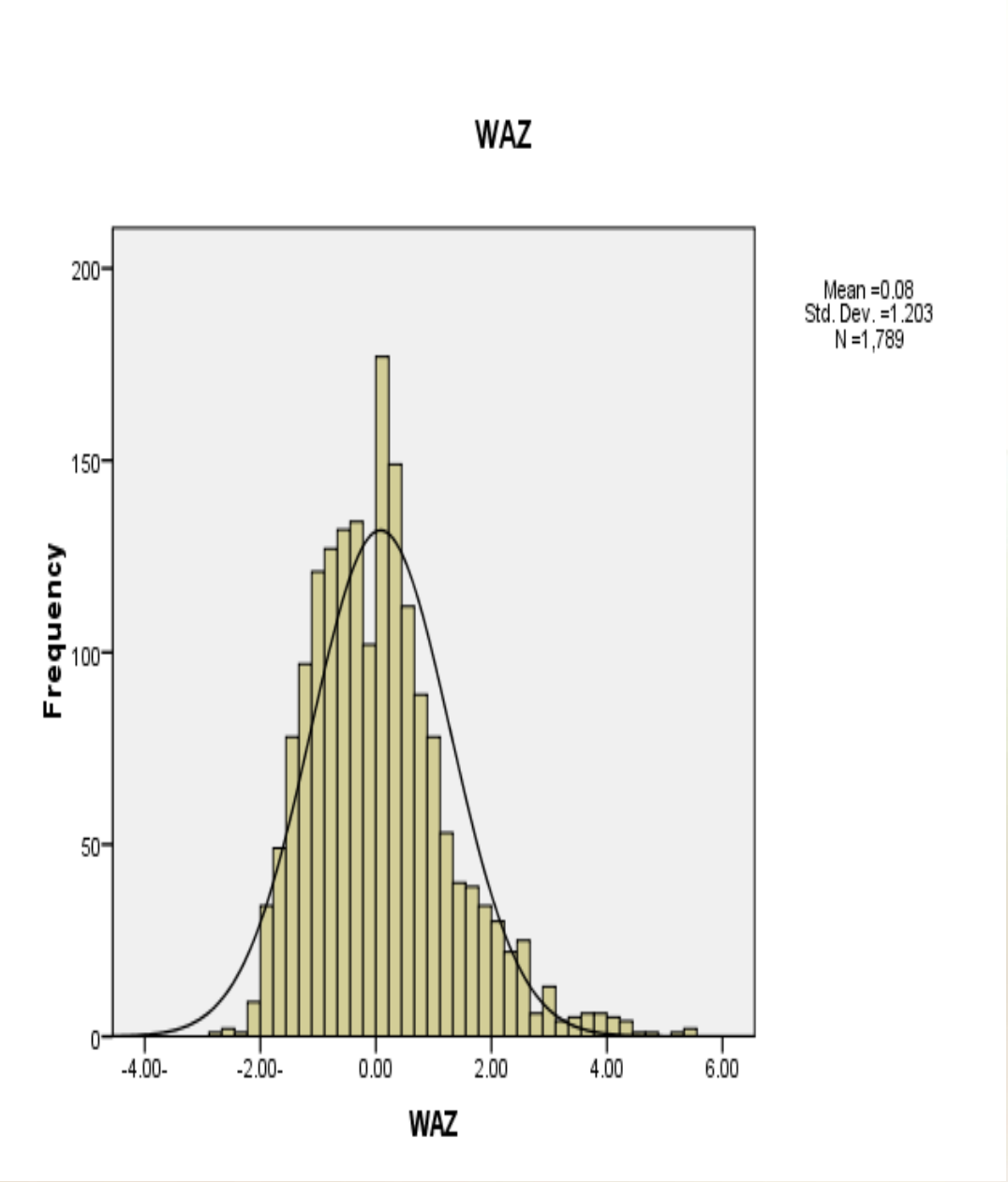


WAZ= Weight /Age Z-score

Frequency Distribution Curve of WAZ*

- The mean weight was slightly more than the standard
- Slight shift of the curve to the right.

- *WAZ= Weight /Age Z-score



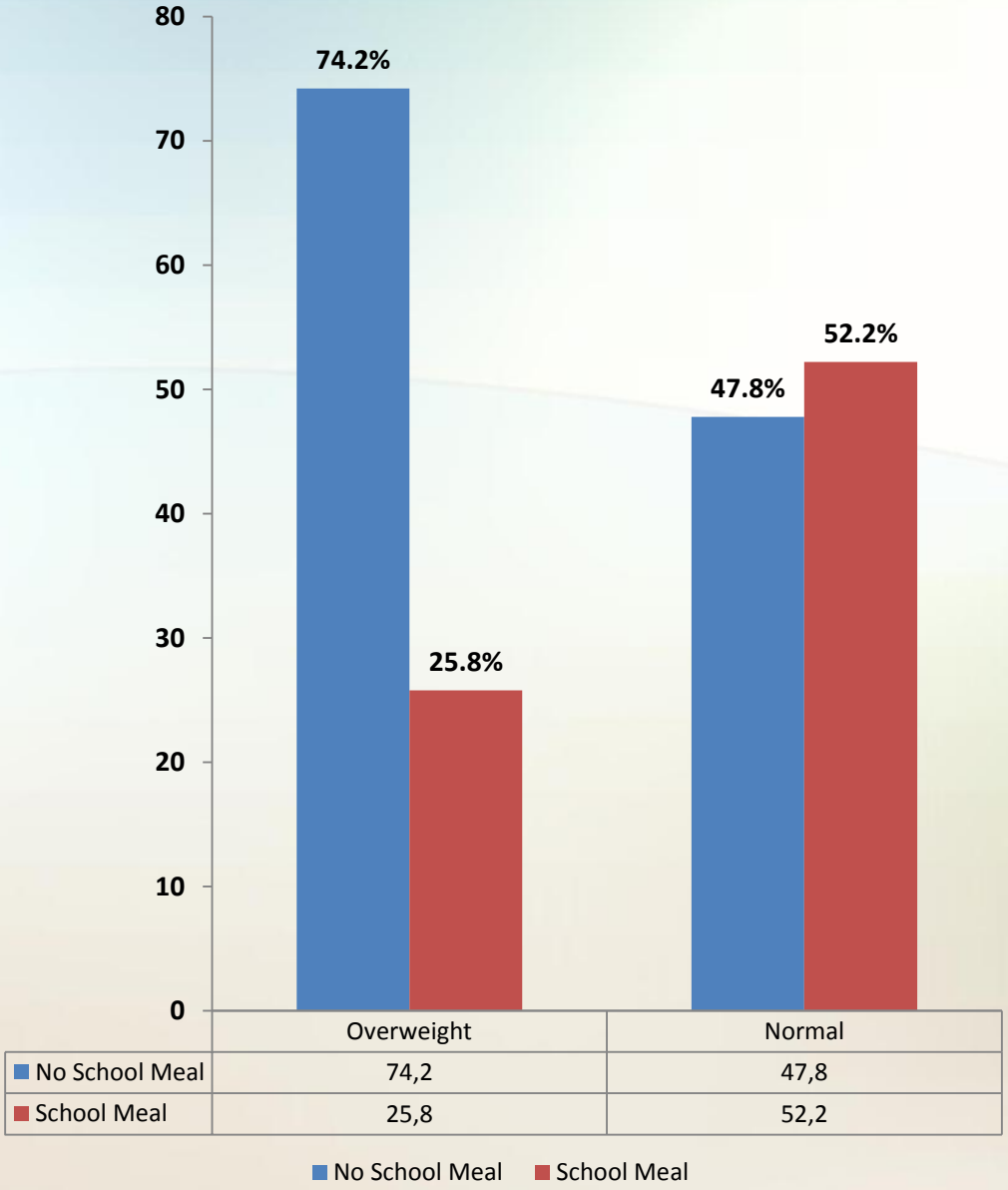
FACTORS AFFECTING OVERWEIGHT CHILDREN

Predictors to Children's Overweight

- Skipping Breakfast
- Increase Family Income
- Small Family Size
- Not Having School Meal

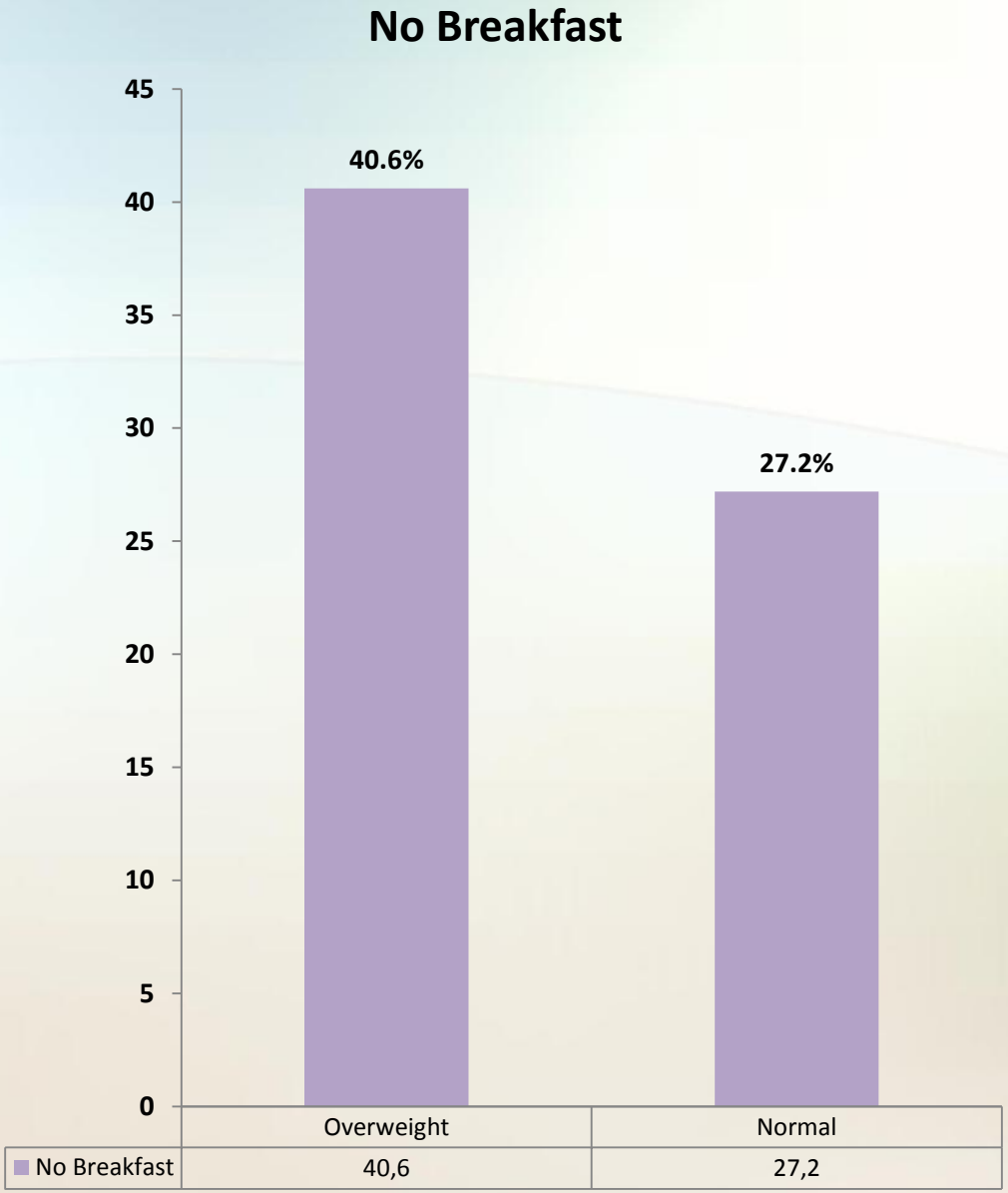
Effect of School Meal on Overweight Children

The majority of overweight children (74.2%) had no school meal.



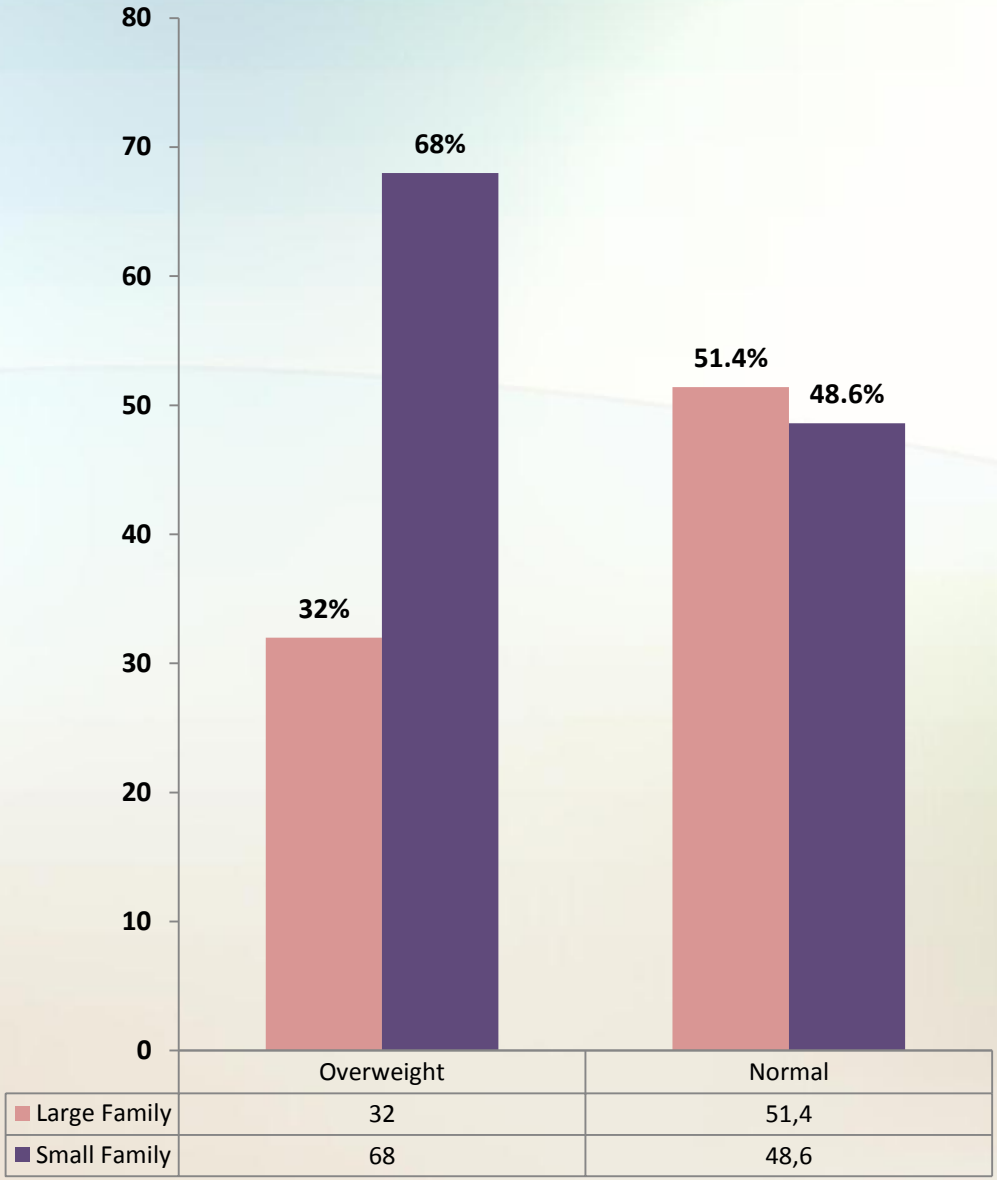
Effect of Breakfast on Overweight Children

- 40.6% of overweight children skipped breakfast compared with 27.2% of breakfast eaters.



Effect of Family Size on Overweight Children

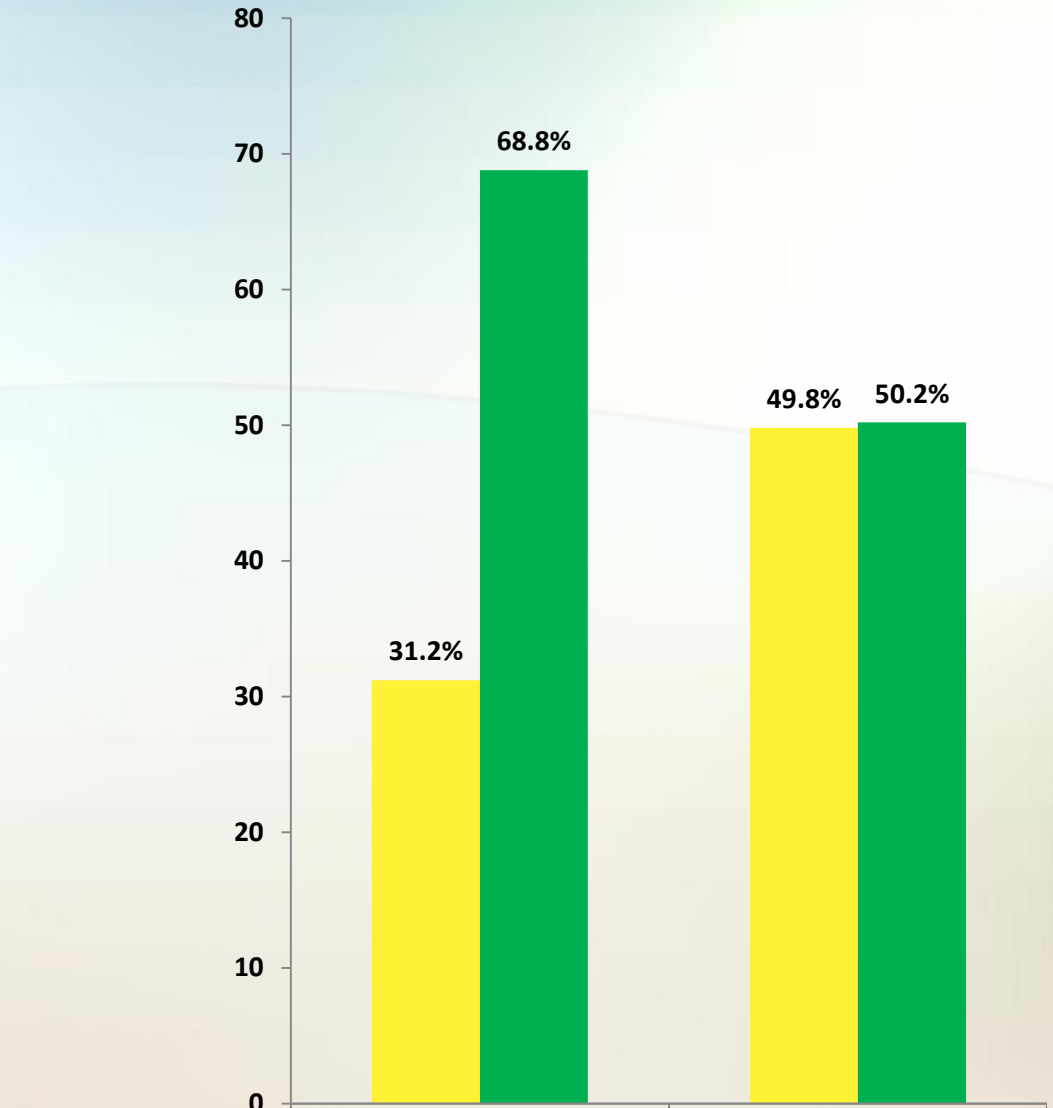
- Large family size are associated with reduced risk of having overweight children (OR=0.45)
- Large family size leads to decrease in child's share of family income and diminished child's share of daily food.



	Overweight	Normal
Large Family	32	51,4
Small Family	68	48,6

Effect of Family Income on Overweight Children

- **Low income family had reduced risk of having overweight children equal half times that of middle income families or fathers. (OR= 0.46)**



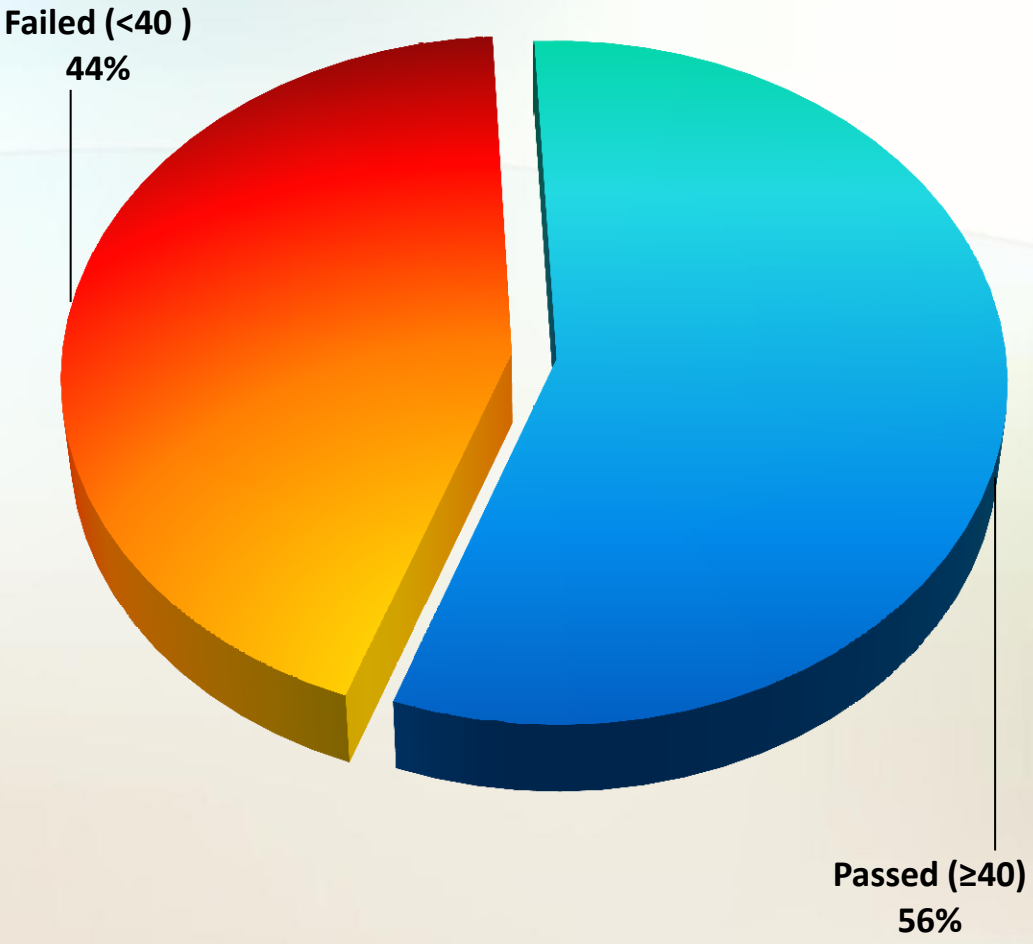
	Overweight	Normal
Low- Income Family	31,2	49,8
Middle- Income Family	68,8	50,2

DISTRIBUTION OF CHILDREN ACCORDING TO ACADEMIC ACHIEVEMENTS

MATHEMATICS

Distribution of Children According to Achievement of Mathematics

The figure shows that 44% of total sample failed in mathematics, and 56% passed

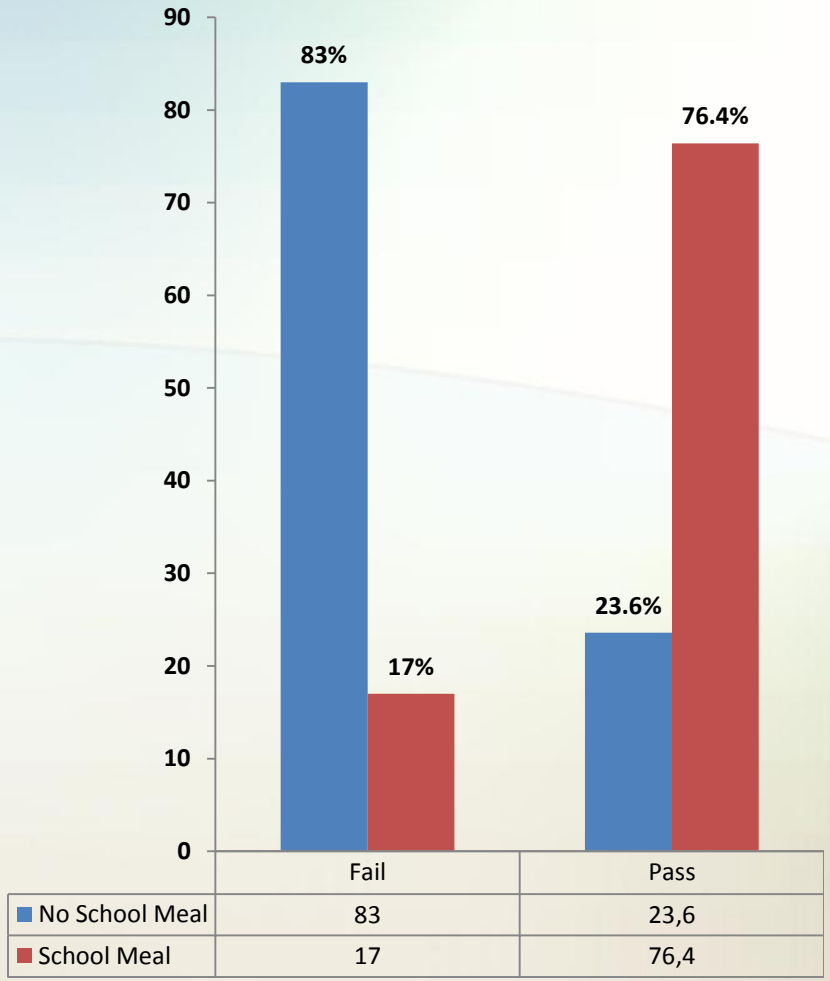


Predictors to Children's Mathematics Grade

- Having School Meal
- Having Breakfast
- School Meal and Number of Meals /day
- School Meal with Increase of Father`s Income
- School Meal with High Education of Mother

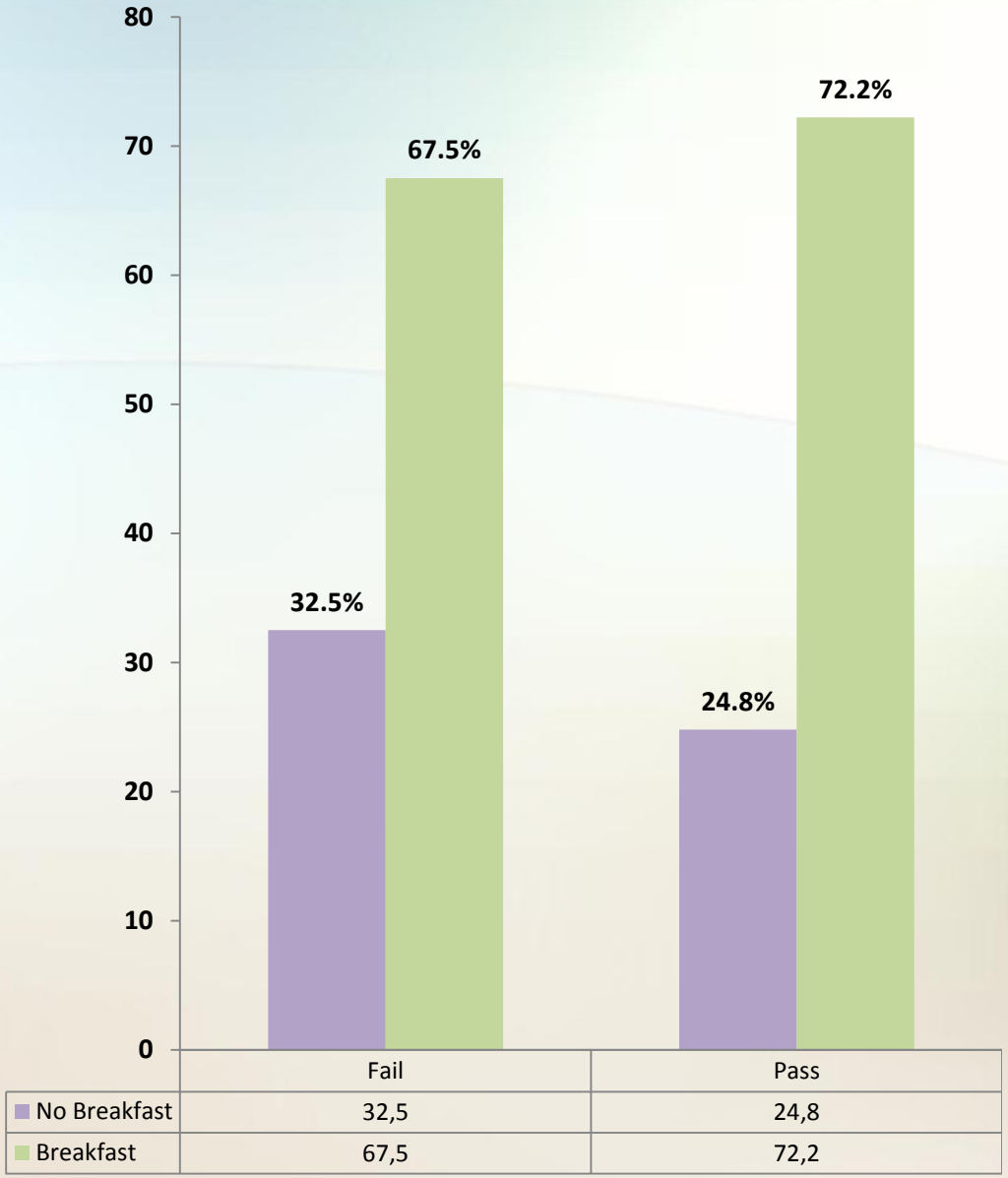
Effect of School Meal on Mathematics Grades

- The majority (76.4%) of the children who passed in mathematics had school meal



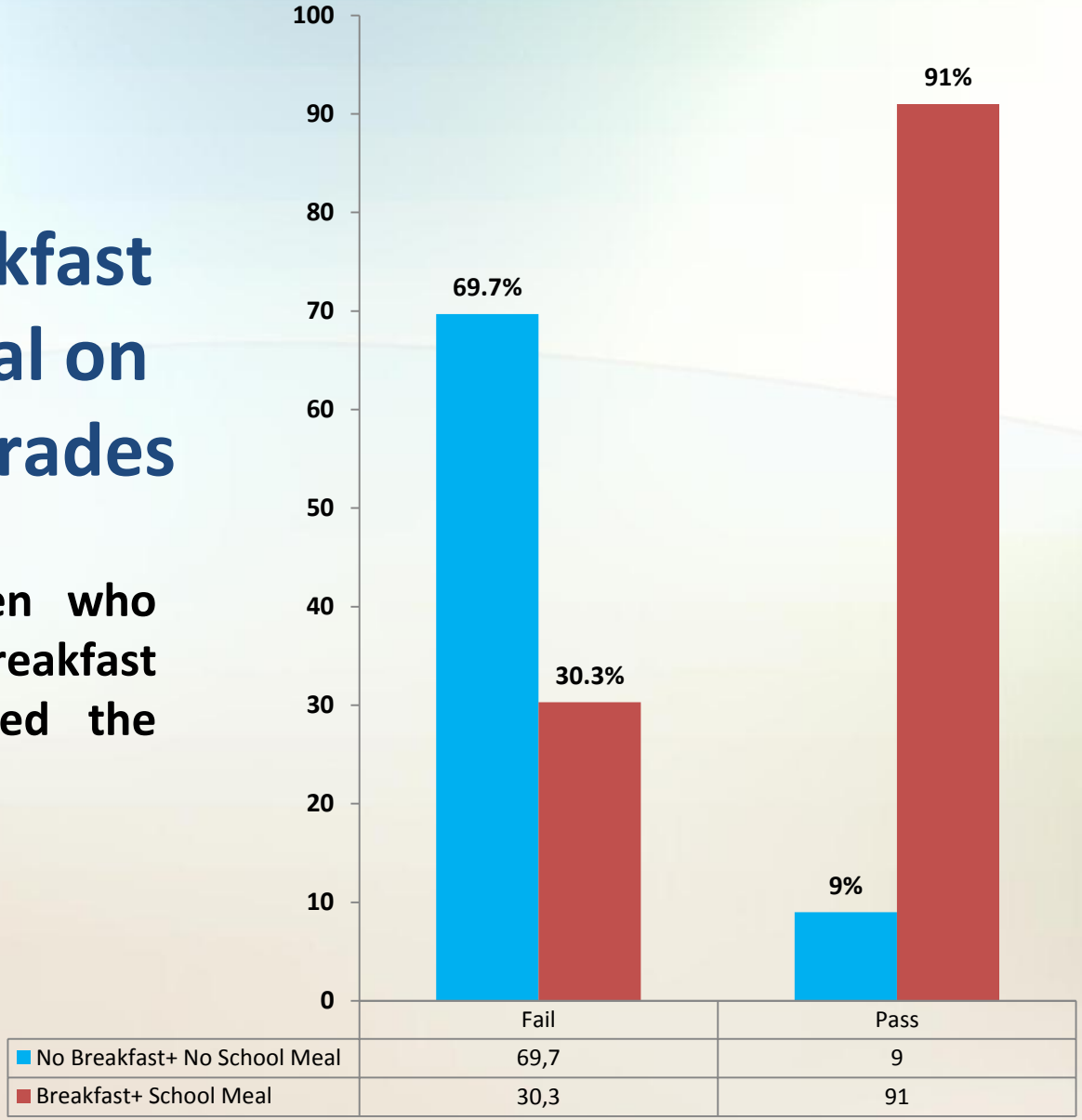
Effect of Breakfast on Mathematics Grades

- The majority of the children who passed in mathematics had breakfast (72.2%)



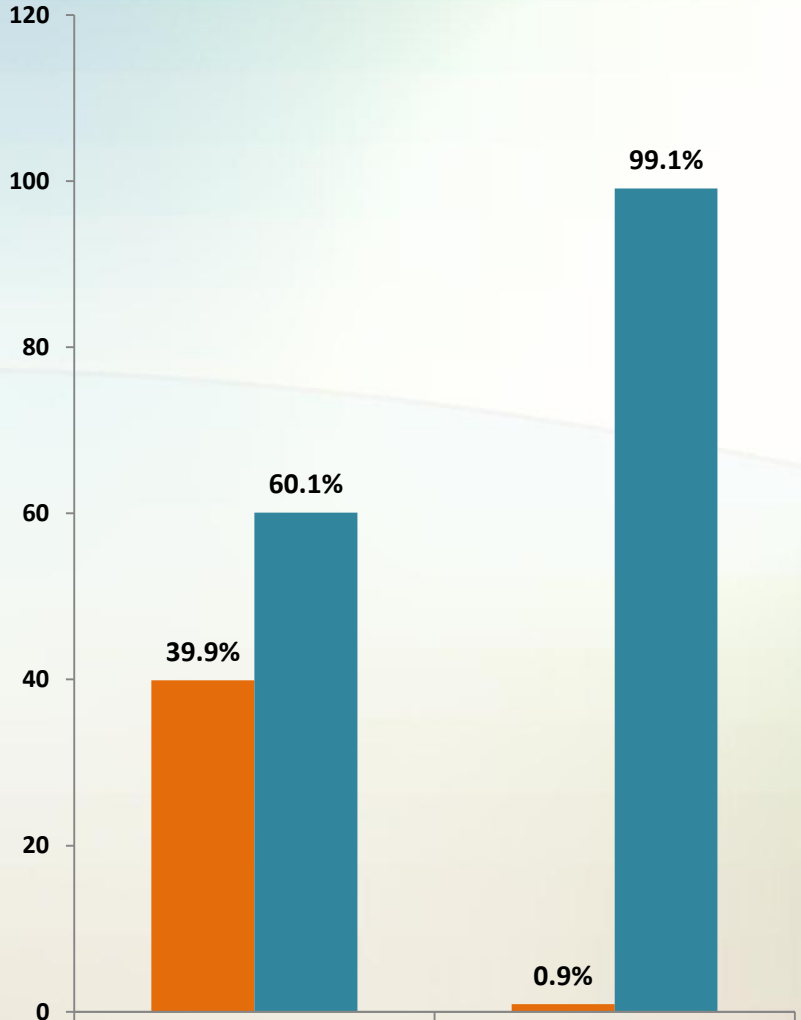
Effect of Breakfast & School Meal on Mathematic Grades

- **Only 9% of children who does not have either breakfast or school meal passed the math test.**



Effect of Breakfast, School Meal & Number of Meals on Mathematic Grades

- **A combination of three or more meals including breakfast in addition to a school meal were taken by 99.1 % of children who passed math.**

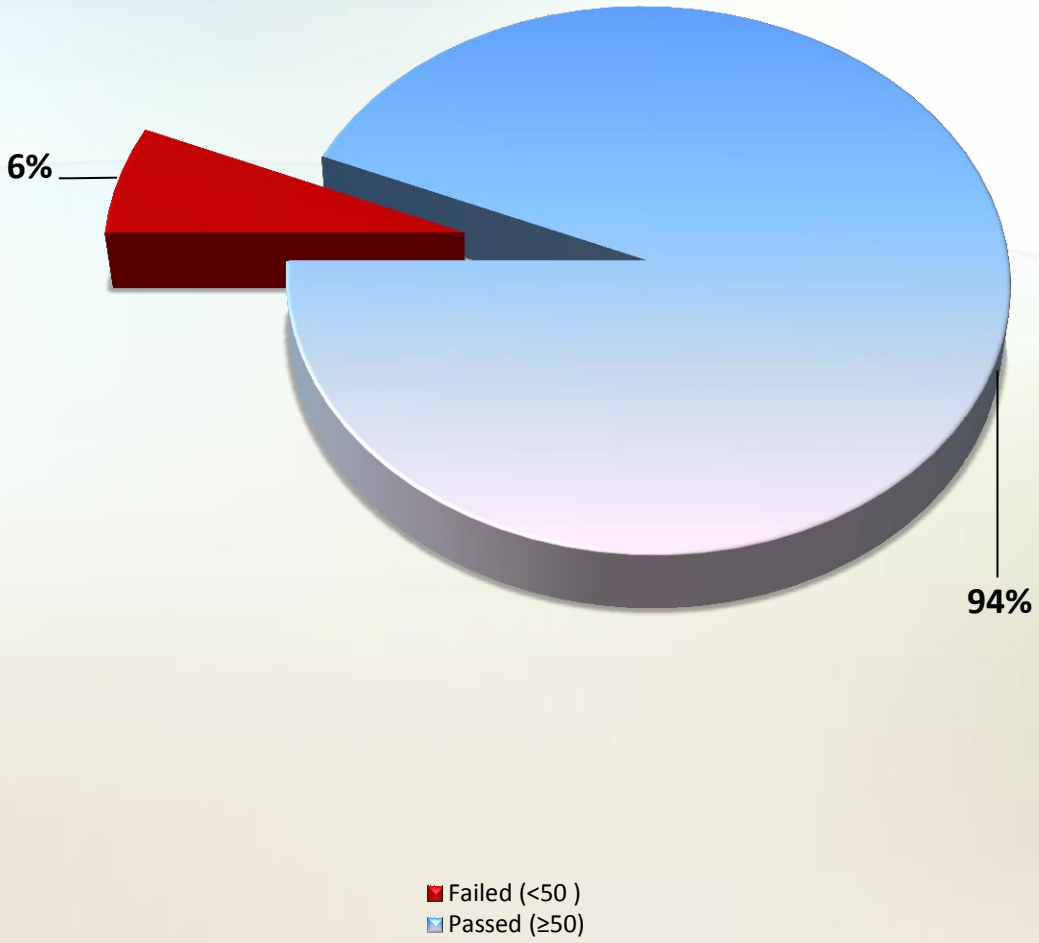


	Fail	Pass
No Breakfast, No School Meal & Number of Meals <3	39,9	0,9
Breakfast, School Meal & Number of Meals ≥3	60,1	99,1

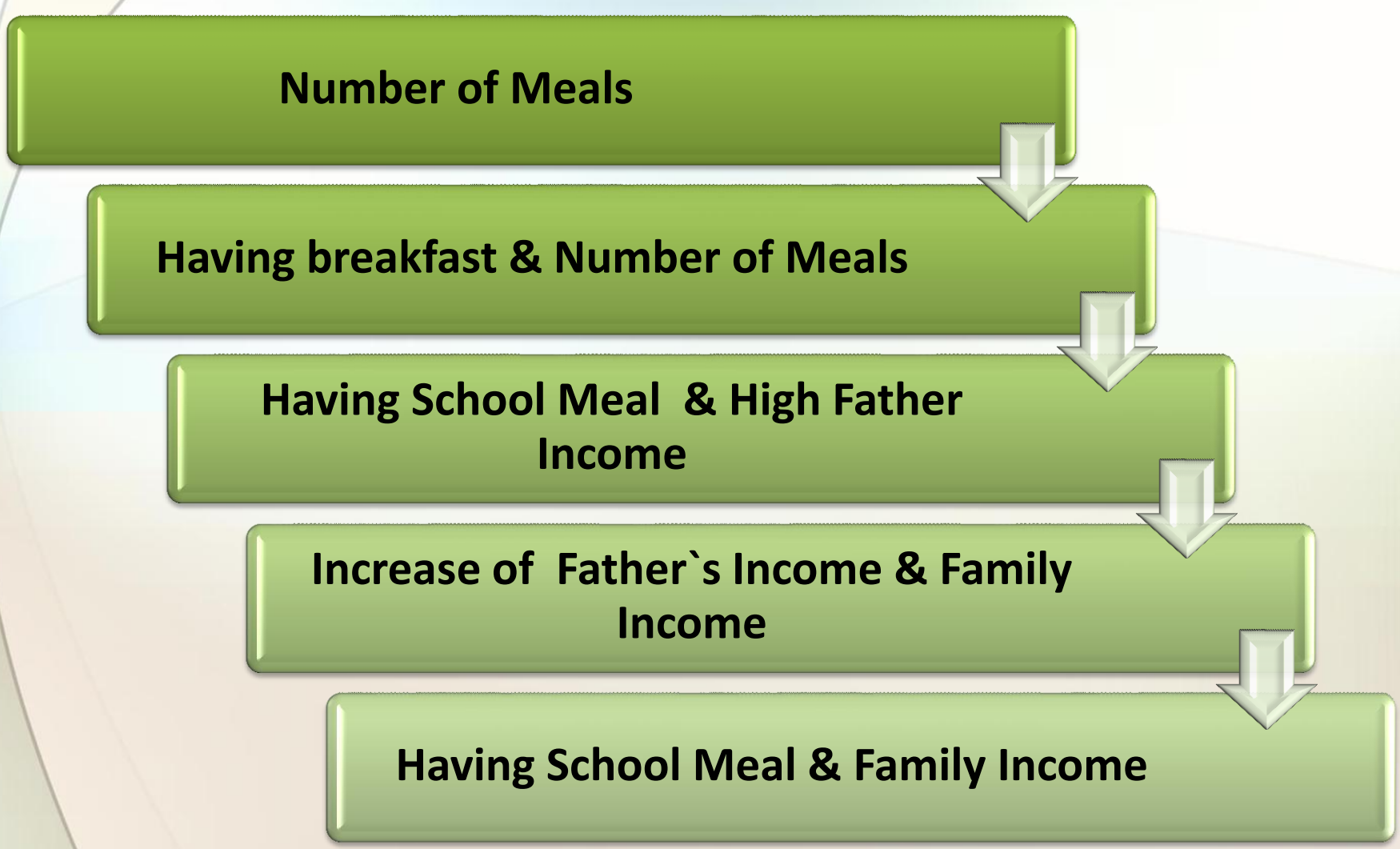
Arabic language

Arabic Language Scores Distribution

The figure shows that 6% of all children failed in Arabic subject , while 94% passed.



Predictors to Children's Arabic Language Grades

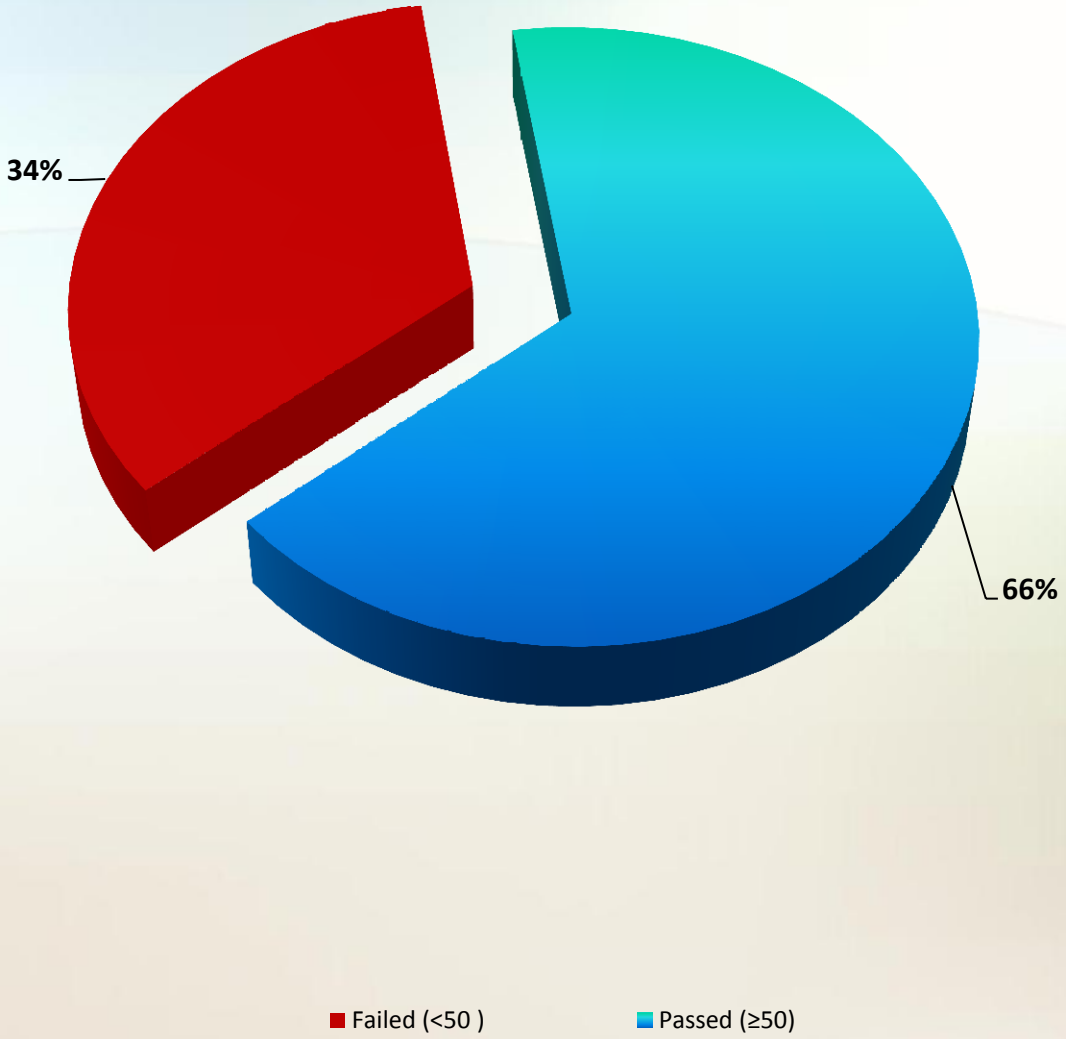


- **The findings of the study although seems strange and opposite to what is expected.**
- **Nutritional factors was in favour of failures. This could be explained as only 6% of total sample failed in Arabic, versus 44% failure in mathematics.**

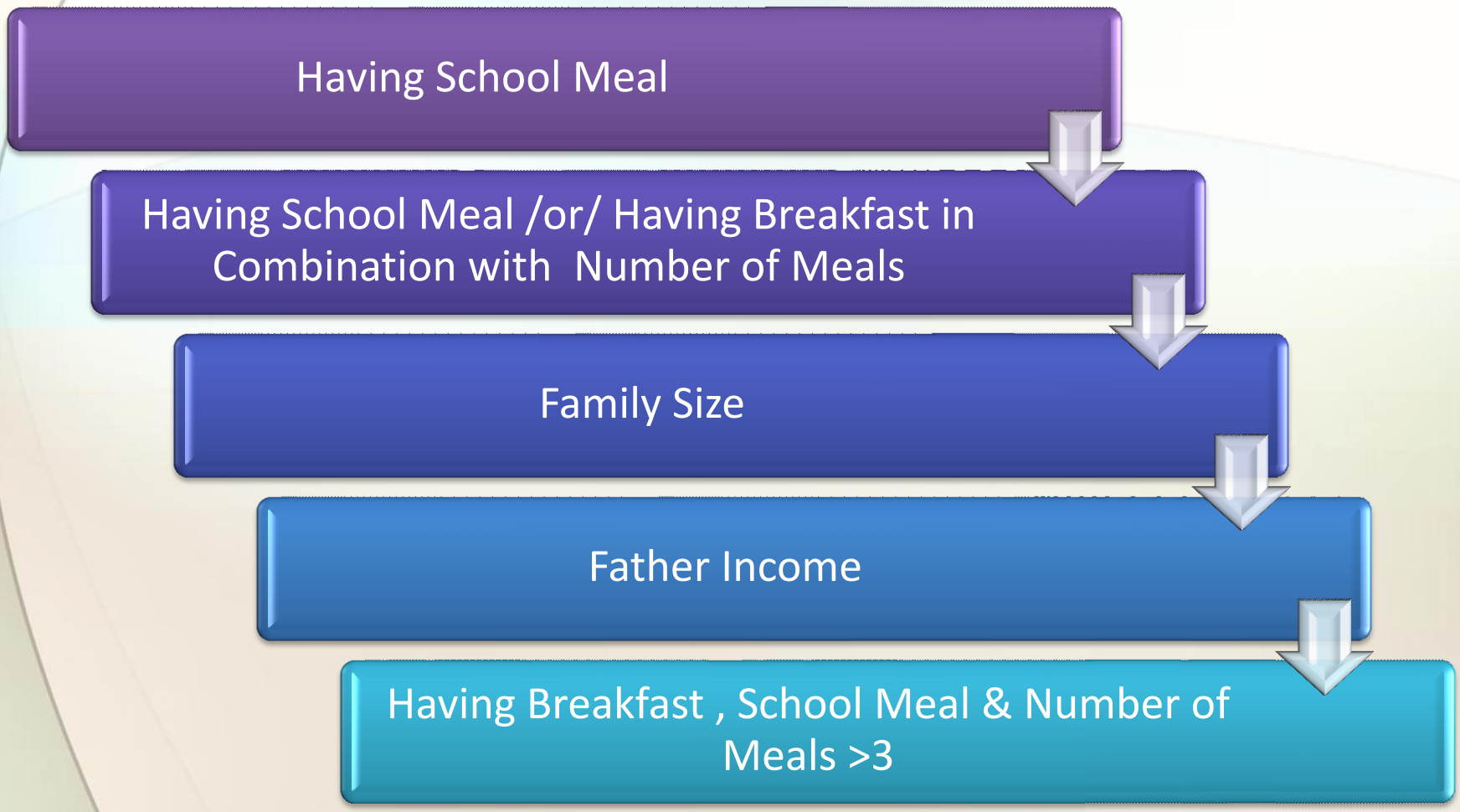
ACADEMIC PERFORMANCE

School Achievements Distribution

- The figure shows that 34% of children failed; while 66% passed total school grades (scored ≥ 50% of total subjects scores).

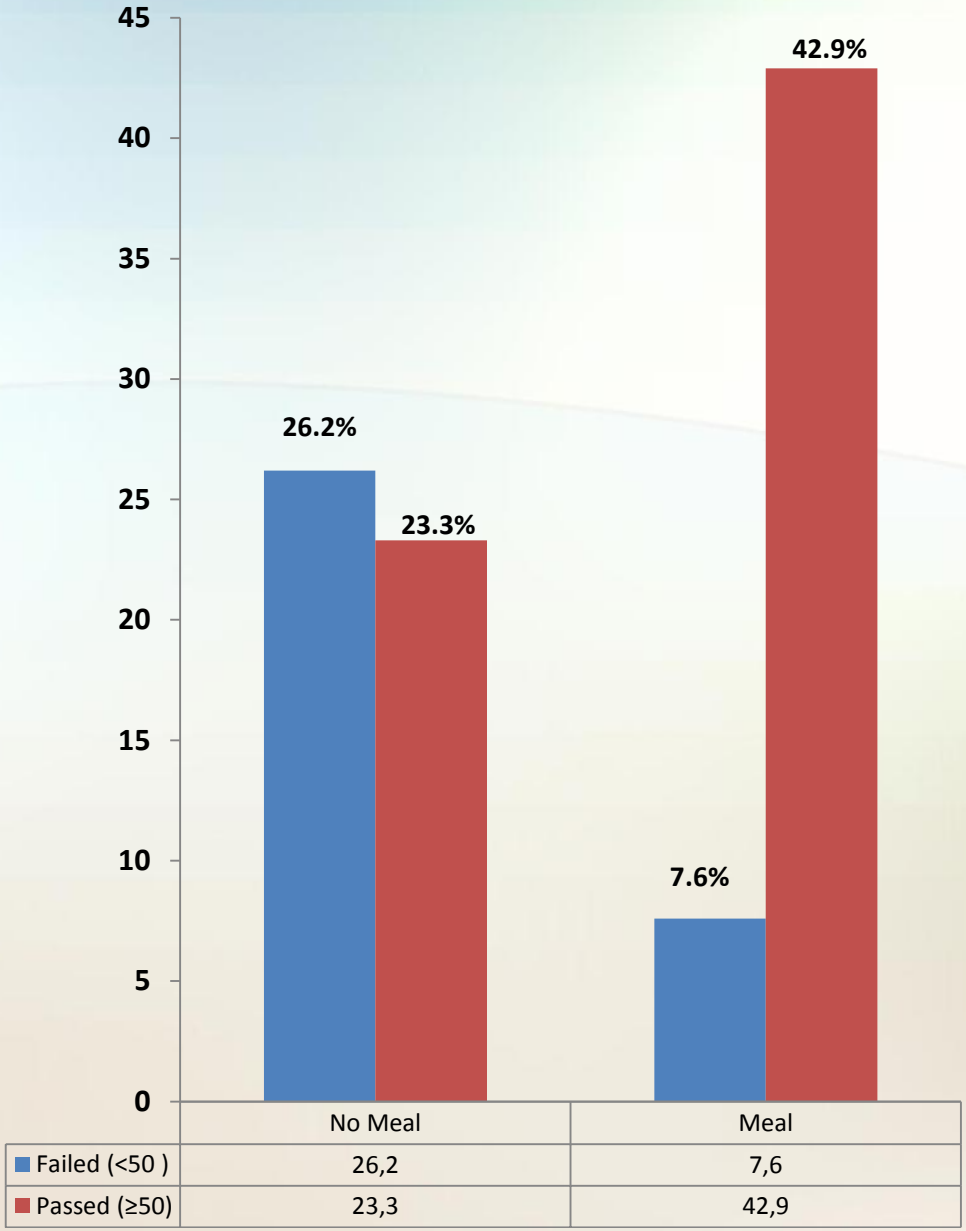


Predictors to Children's School Achievement



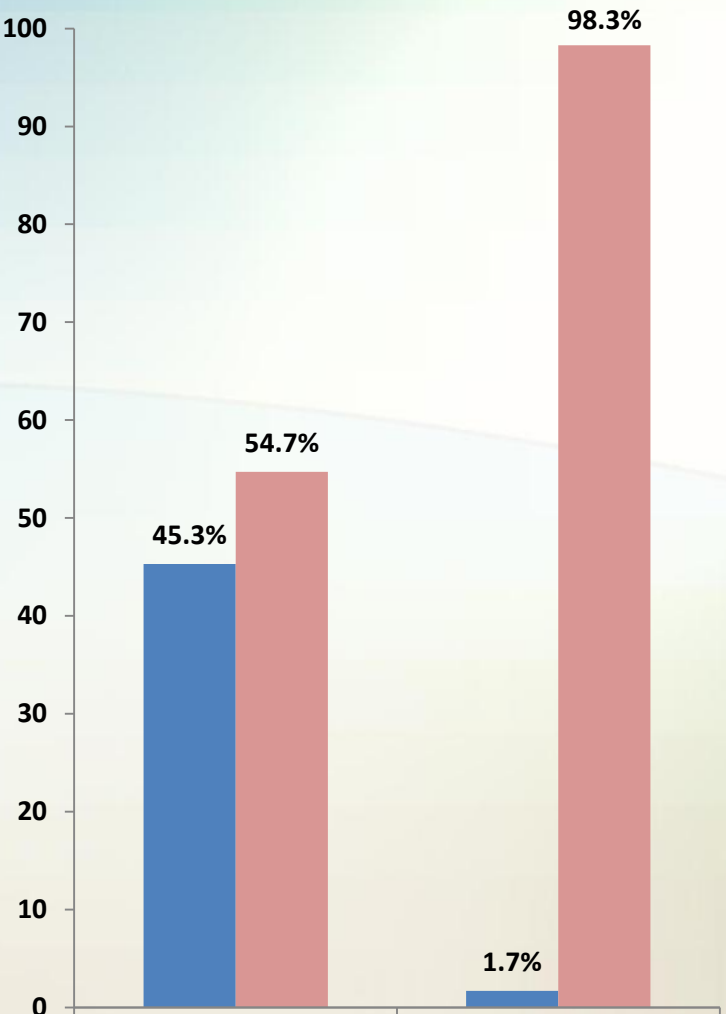
Effect of School Meal on School Achievements

- 26.2% of total sample had no school meal and failed in total school performance
- only 7.6% of total sample had school meal and failed in total school performance.



Effect of School Meal and Number of Meals on School Achievements

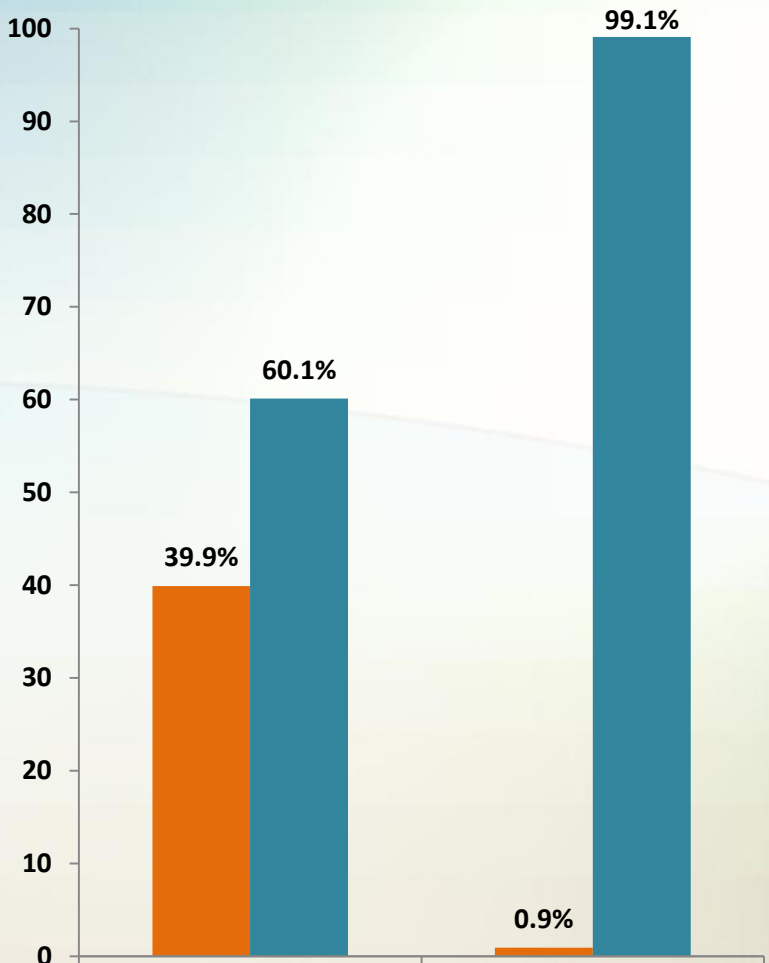
- **A combination of school meal and 3 or more meals have positive impact (98.3%) on overall academic performance.**



	Fail	Pass
No School Meal + Number of Meals <3	45,3	1,7
School Meal + Number of Meals ≥3	54,7	98,3

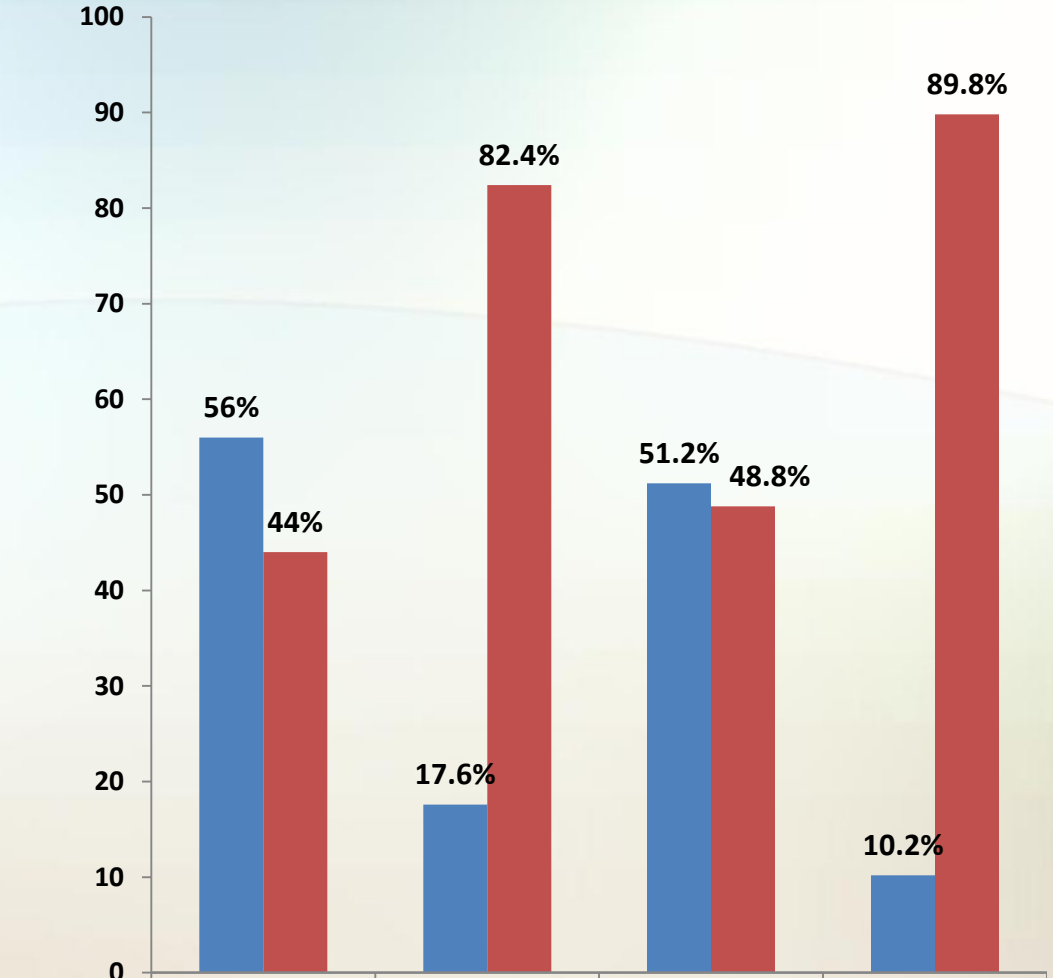
Effect of School Meal, Breakfast and Number of Meals on School Achievements

- A combination of school meal, breakfast and 3 or more meals have positive impact on overall academic performance.



Effect of Family Size on School Achievements

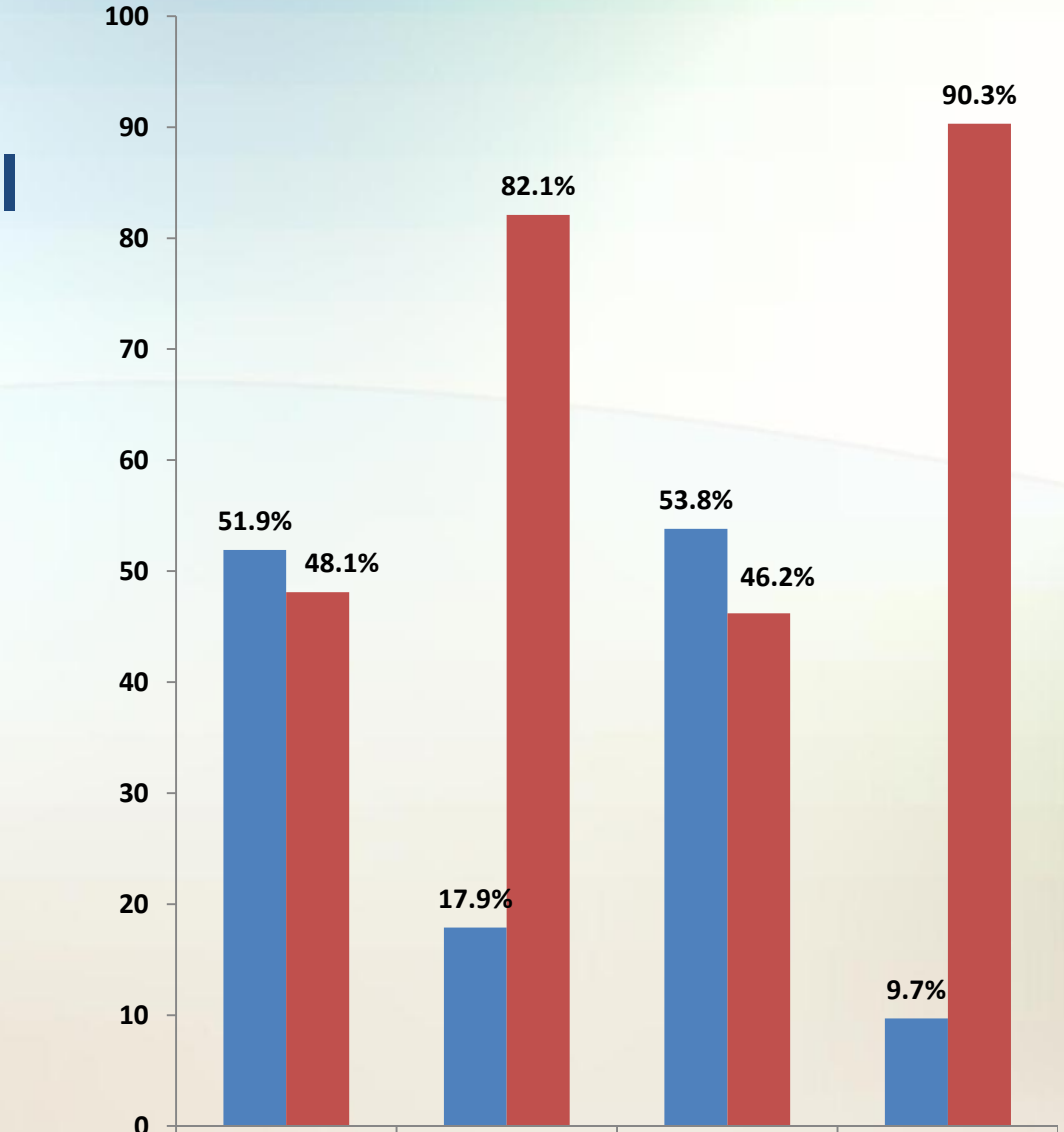
- A combination of school meal and small family has positive impact on overall academic performance.



	Large Family		Small Family	
	No Meal*	Meal**	No Meal*	Meal**
<50 Fail	56	17,6	51,2	10,2
>=50 Pass	44	82,4	48,8	89,8

Effect of Family Income on School Achievements

- A Combination of high family income and school meal had a positive impact (90.3%) on school passing

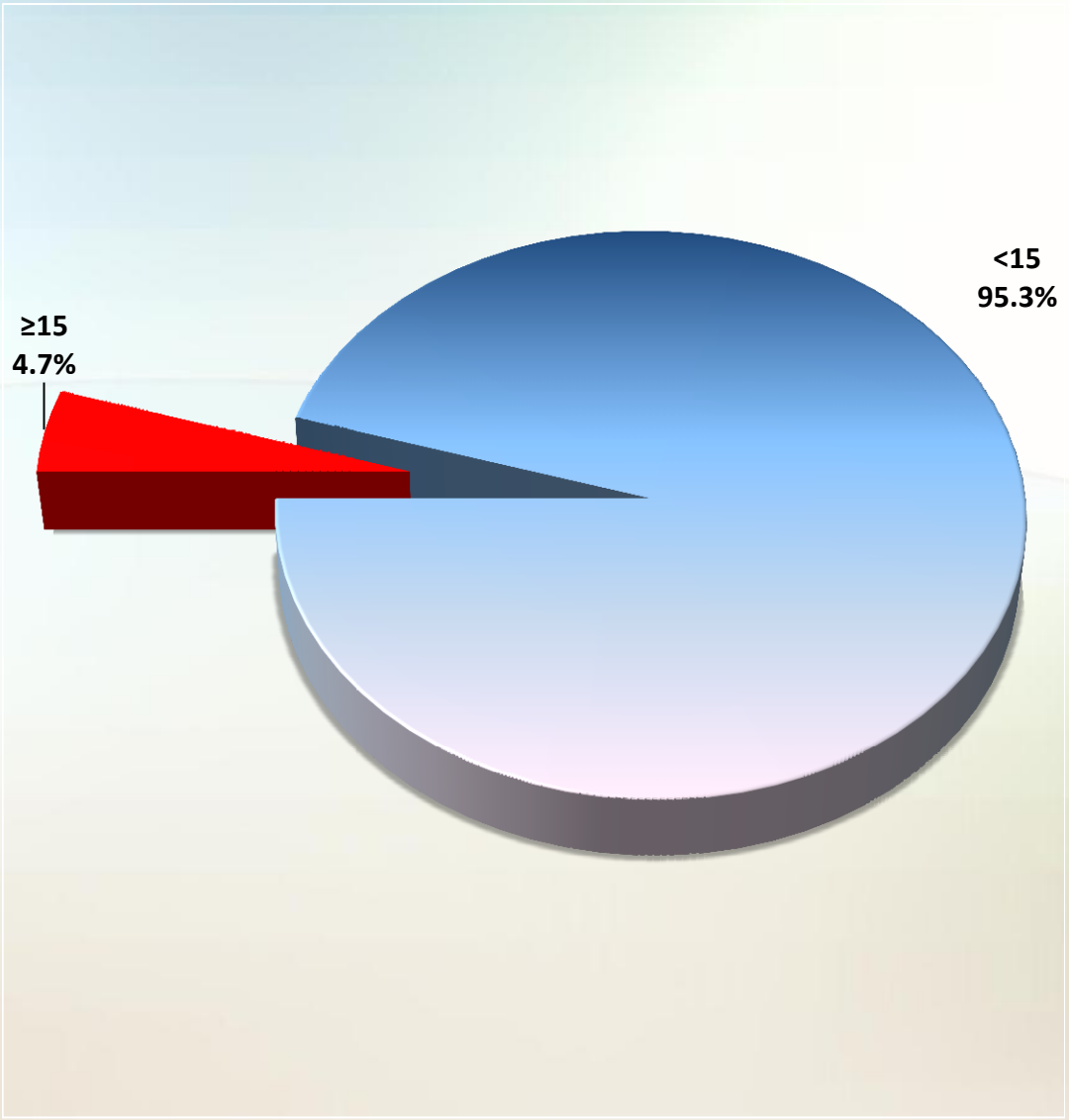


	Low		High	
	No Meal	Meal	No Meal	Meal
<50 Fail	51,9	17,9	53,8	9,7
>=50 Pass	48,1	82,1	46,2	90,3

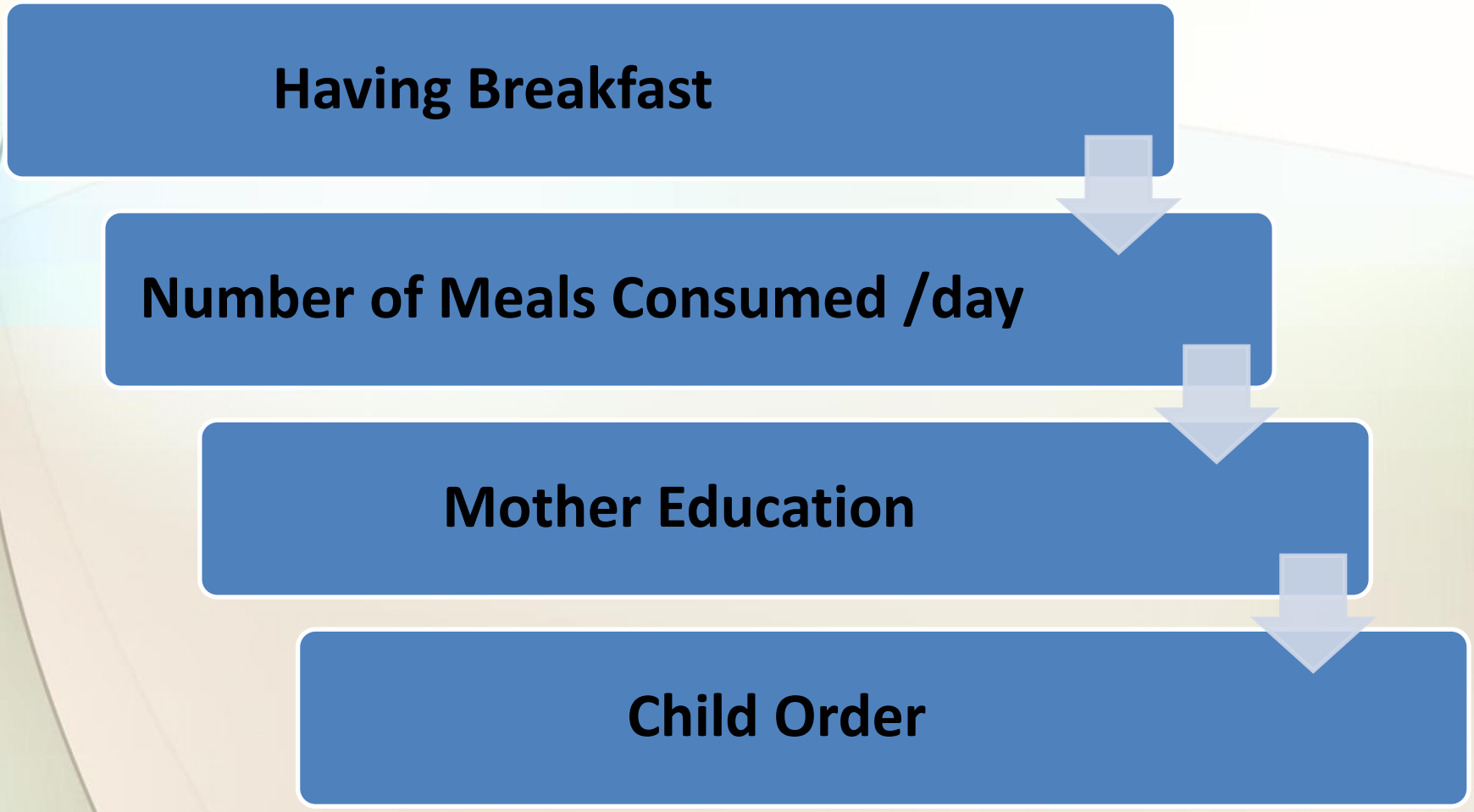
Distribution of Children According to Psychosocial Behavior

Total Psychosocial Behavior Scores

- **Only 4.7% of total sample had <u>Psychosocial Problems</u>**

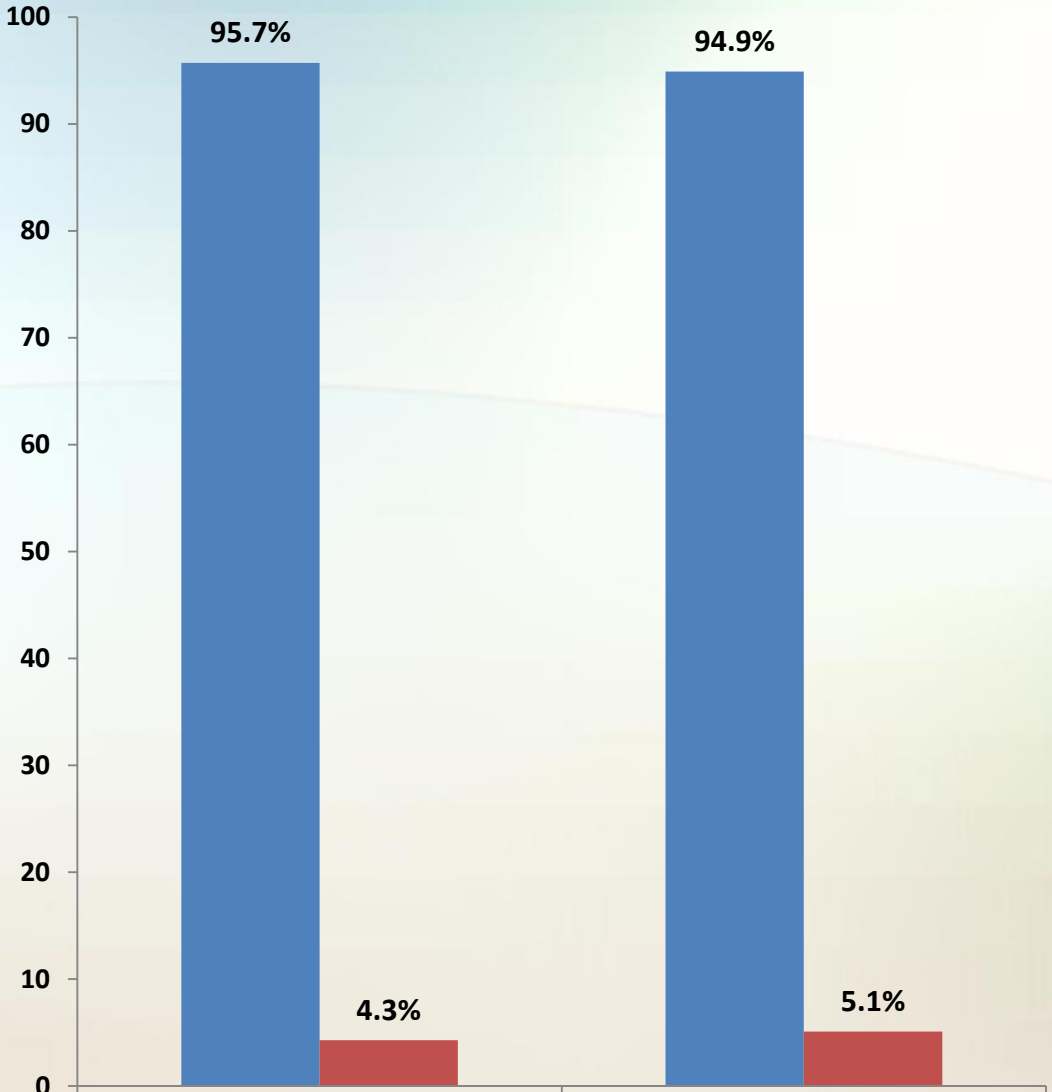


Predictors of Psychosocial Behavior of Children



Effect of School Meal on Behavioral Problems

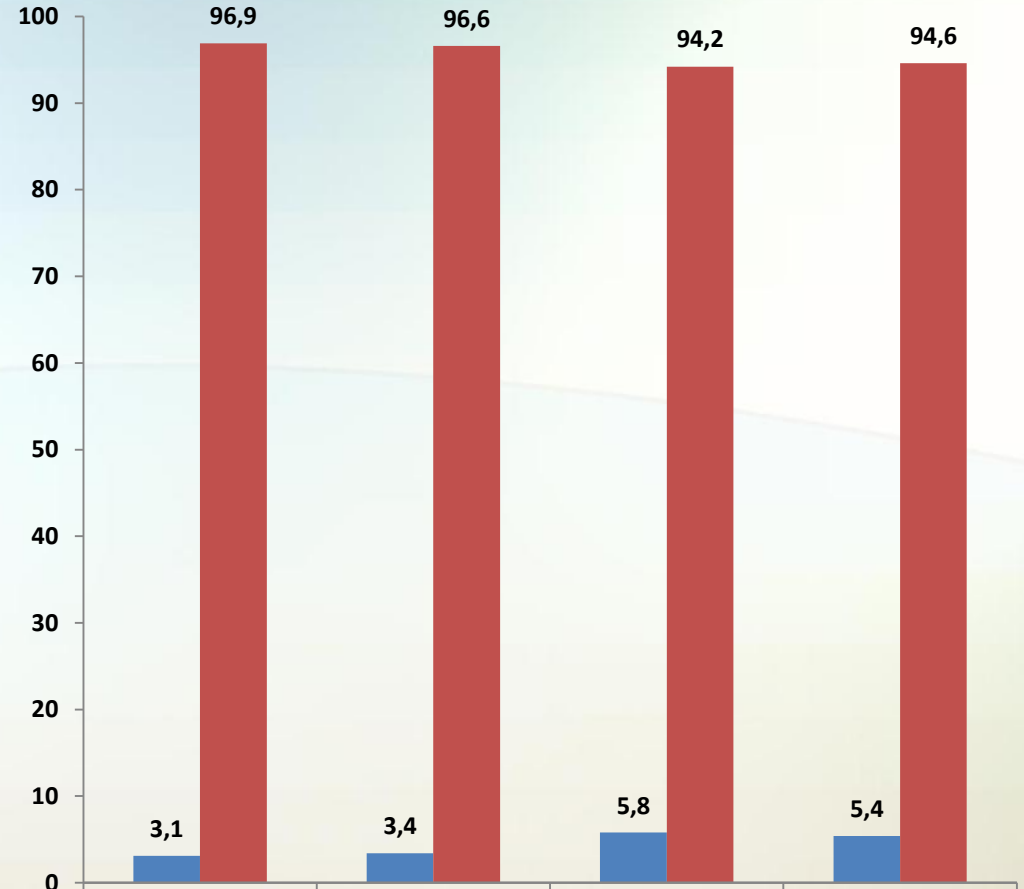
- 4.3% of children going to schools not providing meal had behavioral problems



	No Meal*	Meal**
<15	95,7	94,9
≥15	4,3	5,1

Effect of School Meal & Mother Education

- **5.4% of the children had problems and belonged to schools that dose not give meal and mothers of low education compared with 3.1 of children having school meal and mothers of high education.**



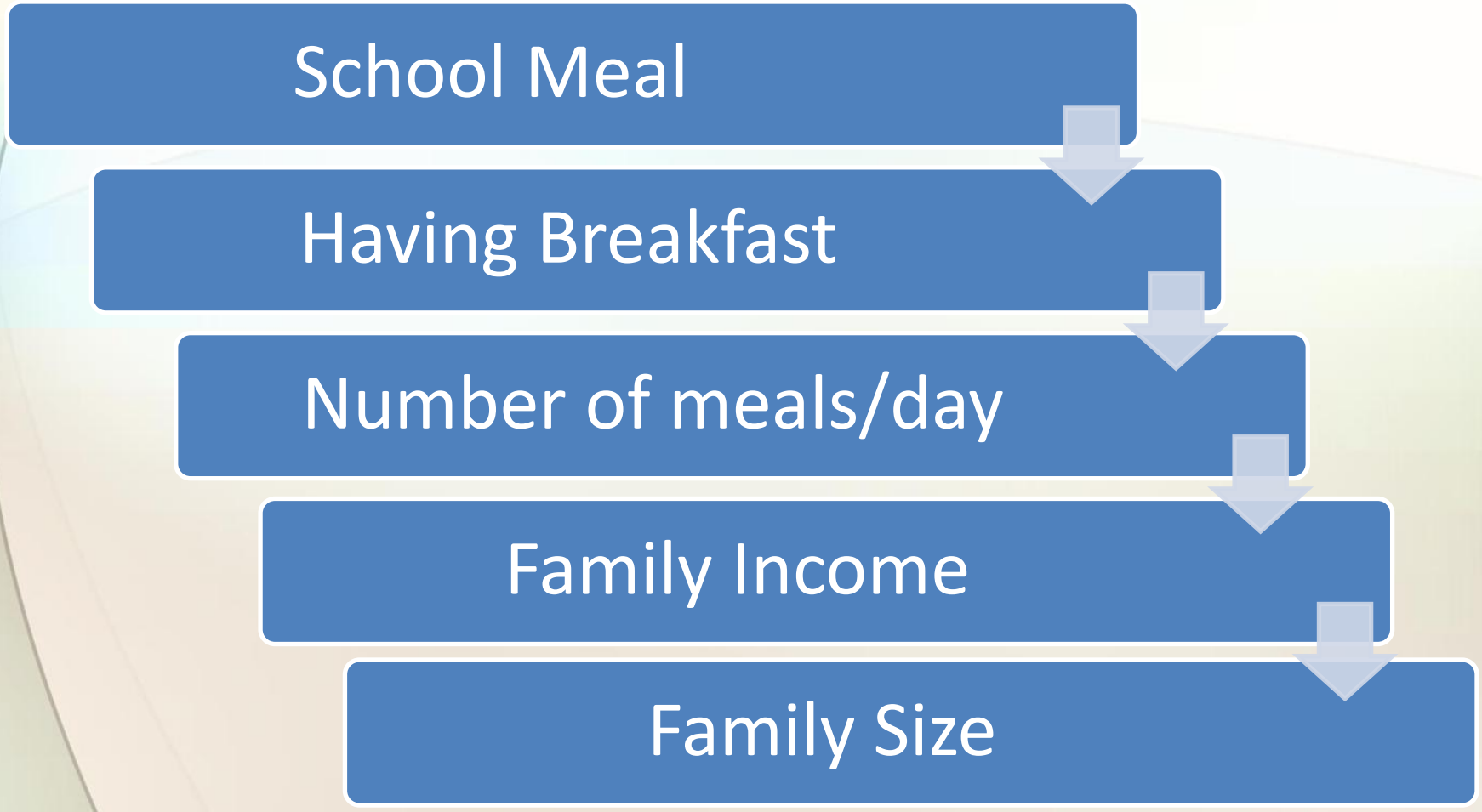
	Meal*	No Meal**	Meal*	No Meal**
	High school- university++		Low Education+	
≥15	3,1	3,4	5,8	5,4
<15	96,9	96,6	94,2	94,6

+Low Education= Less than high school
++High Education= High school or university

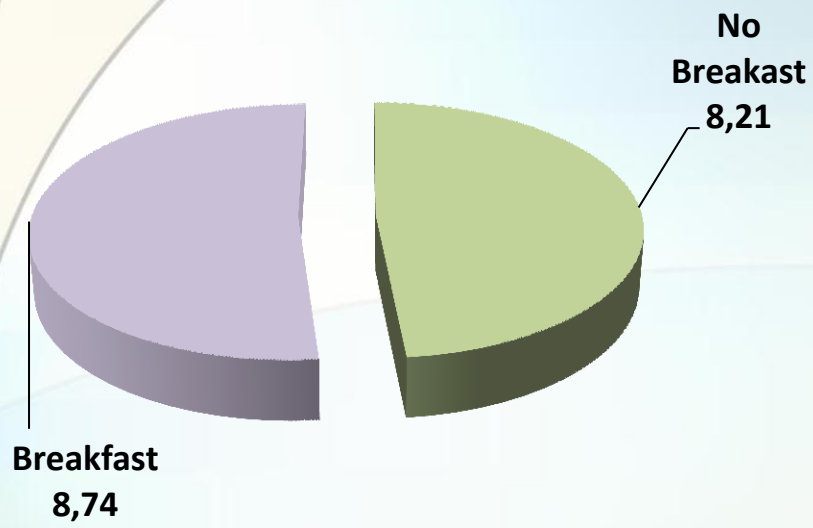
Factors Affecting Cognitive Function

Memory Recall

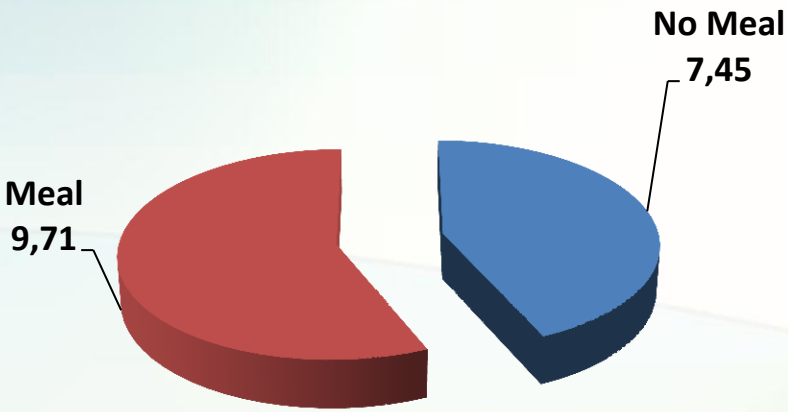
Predictors for Memory Recall



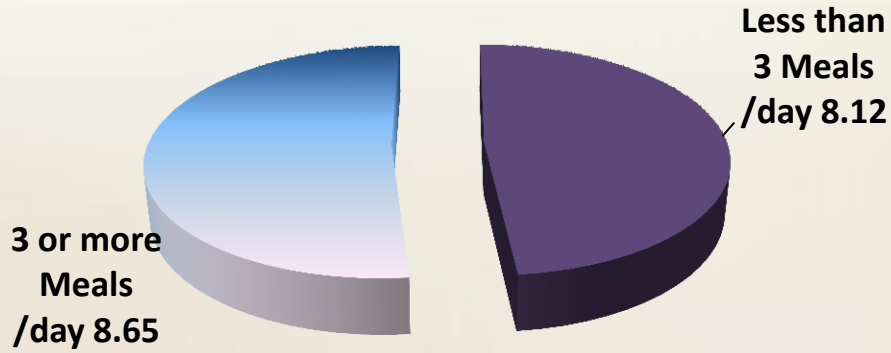
Effect of Breakfast



Effect of School Meal



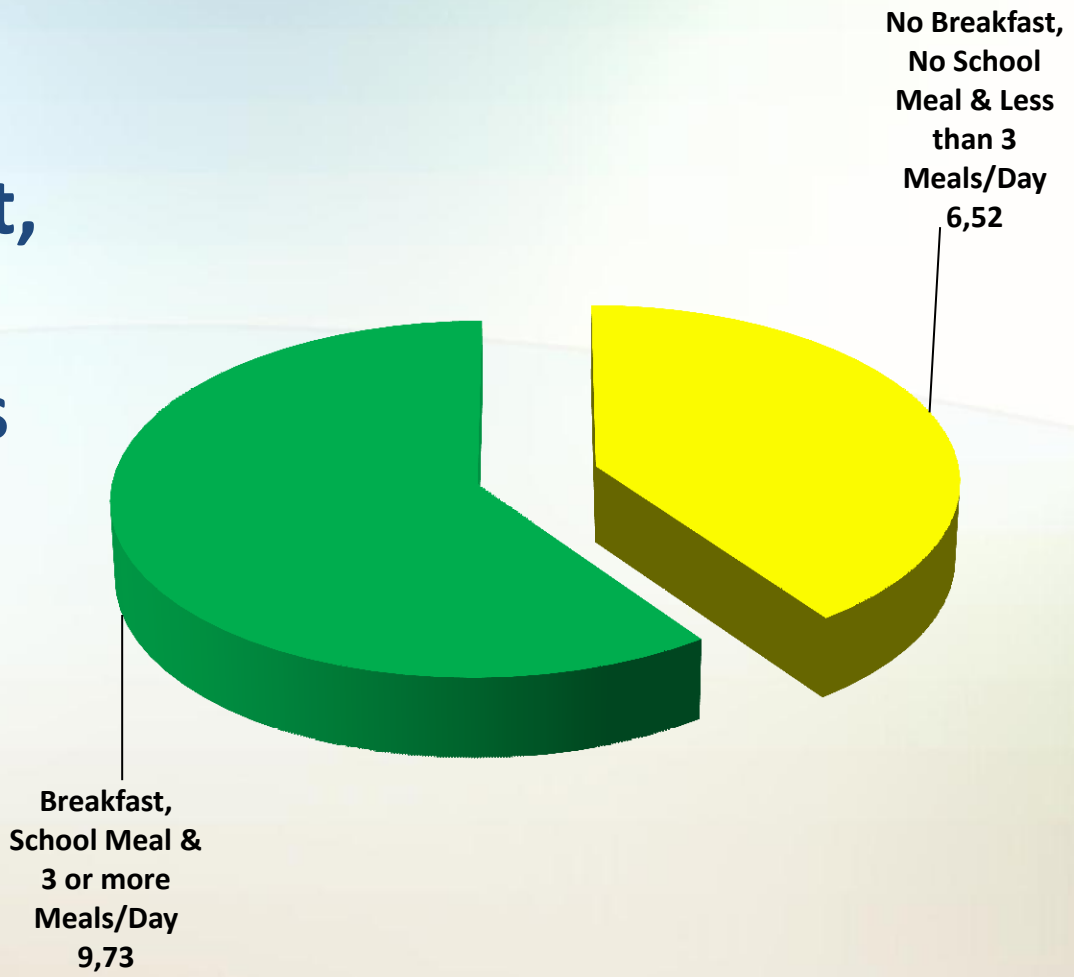
Effect of Number of Meals



Nutritional factors **positively** effect Memory Recall

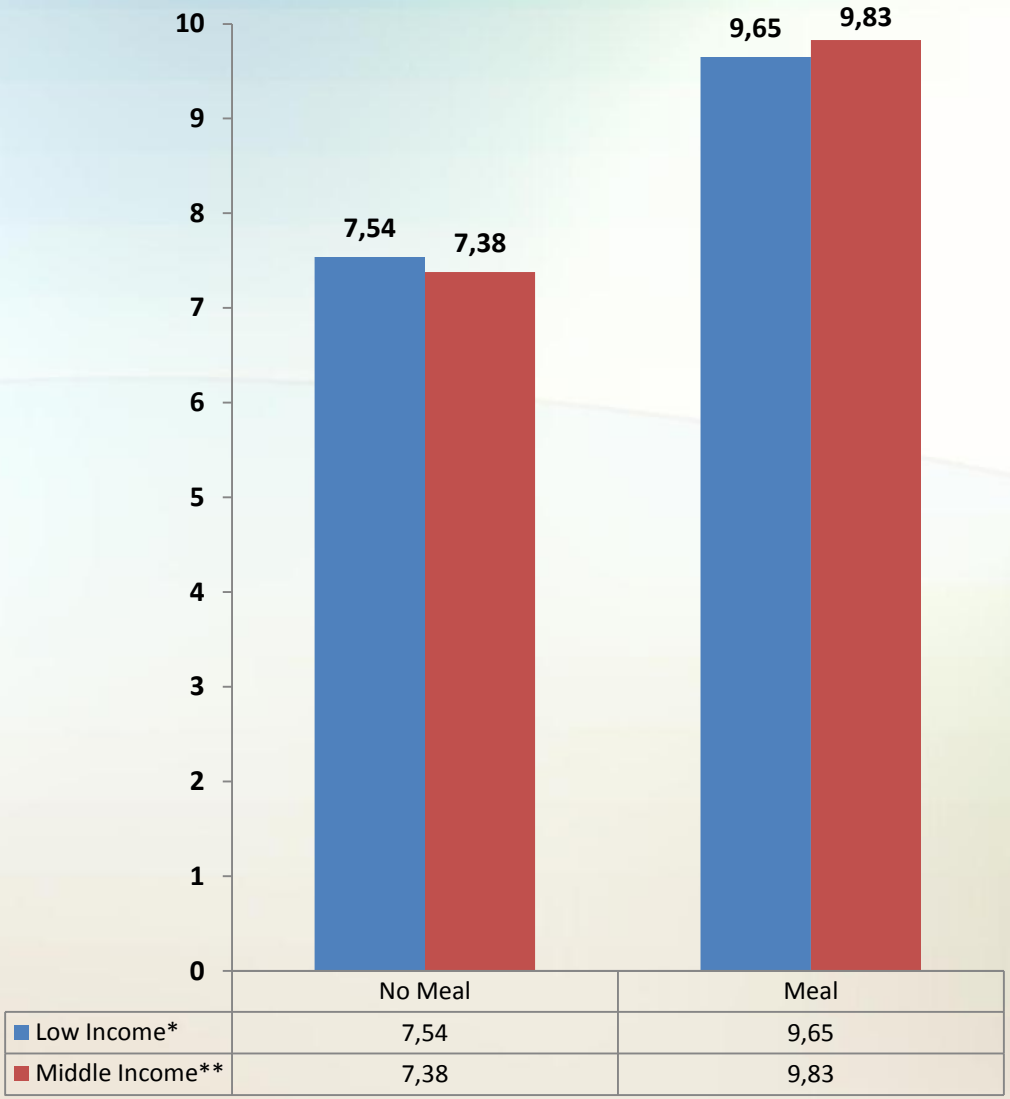
Effect of Breakfast, School Meal & Number of Meals

- No breakfast , no school meal & eating <3 meals/day has a significant lower memory recall scores than their peers



Effect of Father Income & School Meal

The scores are *positively* affected by high father income

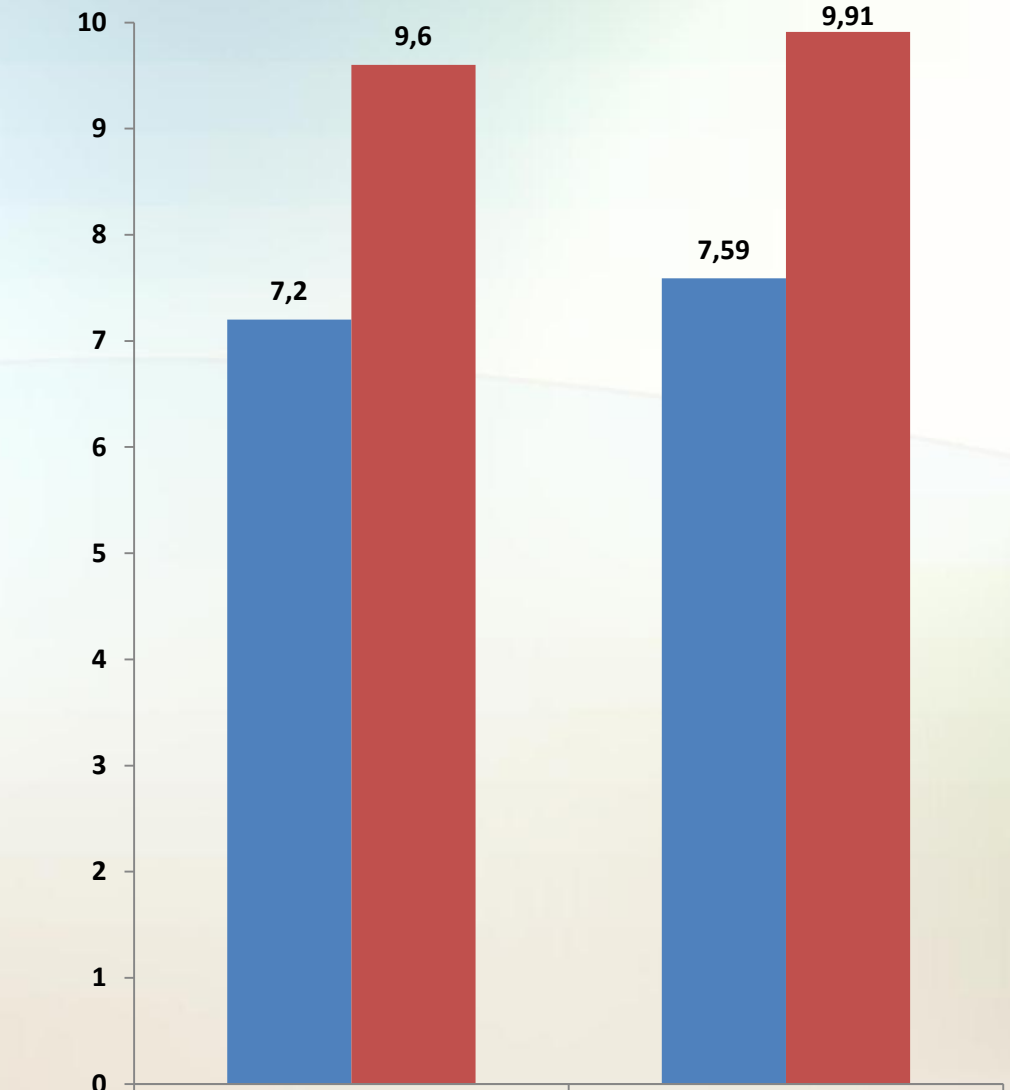


*Low Income= Father is unemployed, day-to day worker, labor, farmer

•** Middle Income= Father is employee, employer, dealer

Effect of Family Size & School Meal

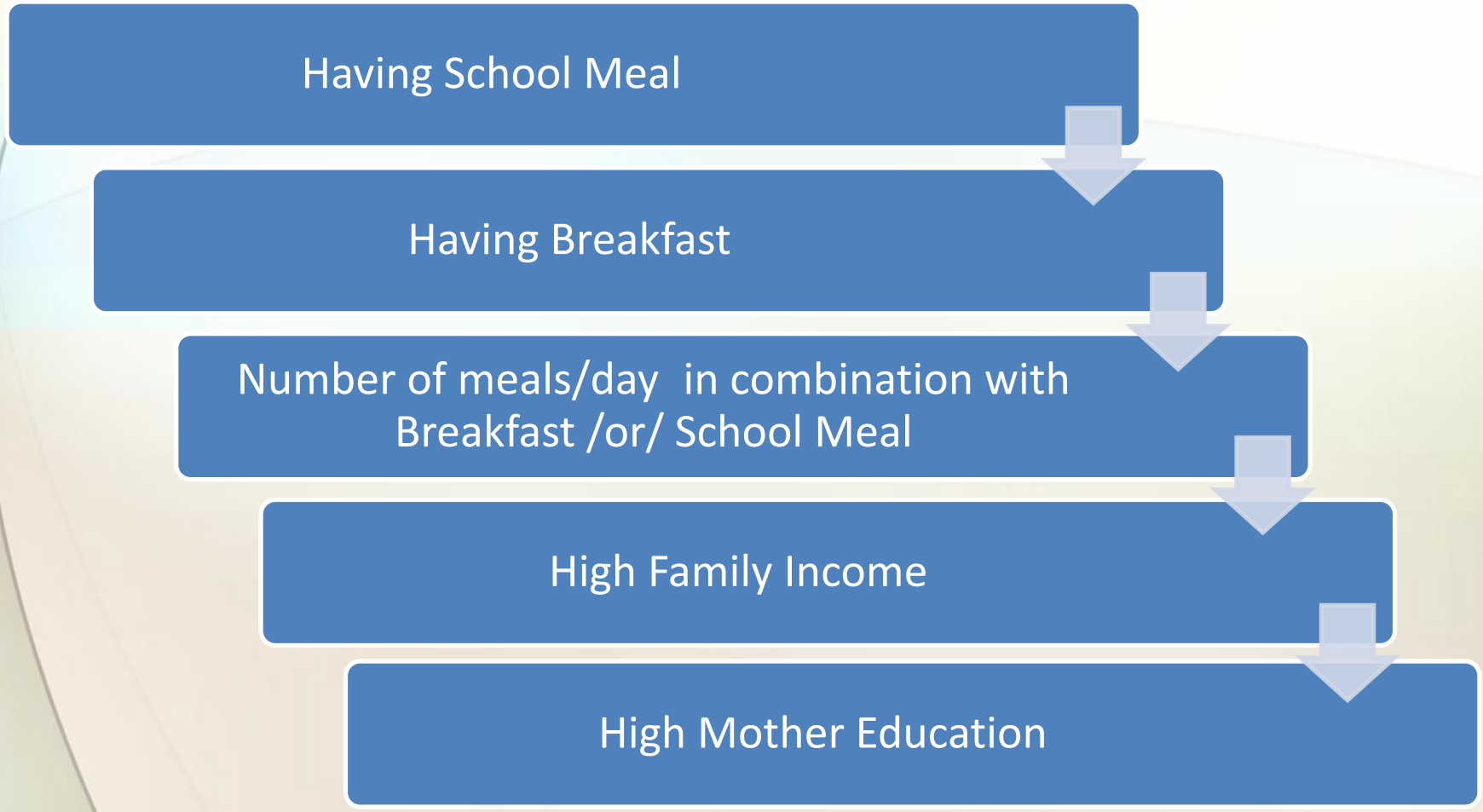
Large family size has *negative* impact



	Large Family*	Small Family**
No Meal	7,2	7,59
Meal	9,6	9,91

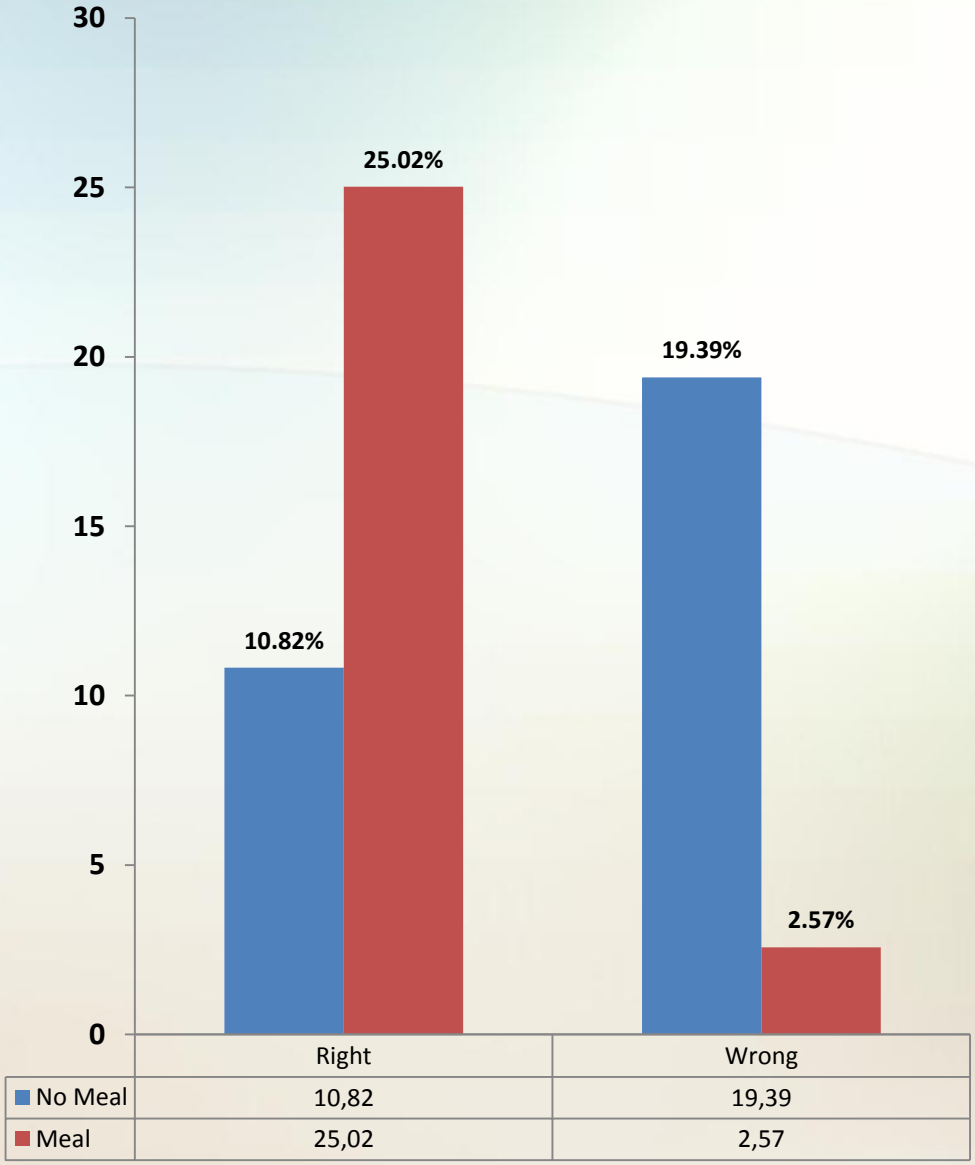
Auditory Vigilance "A"

Predictors for Right Responses



Effect of School Meal

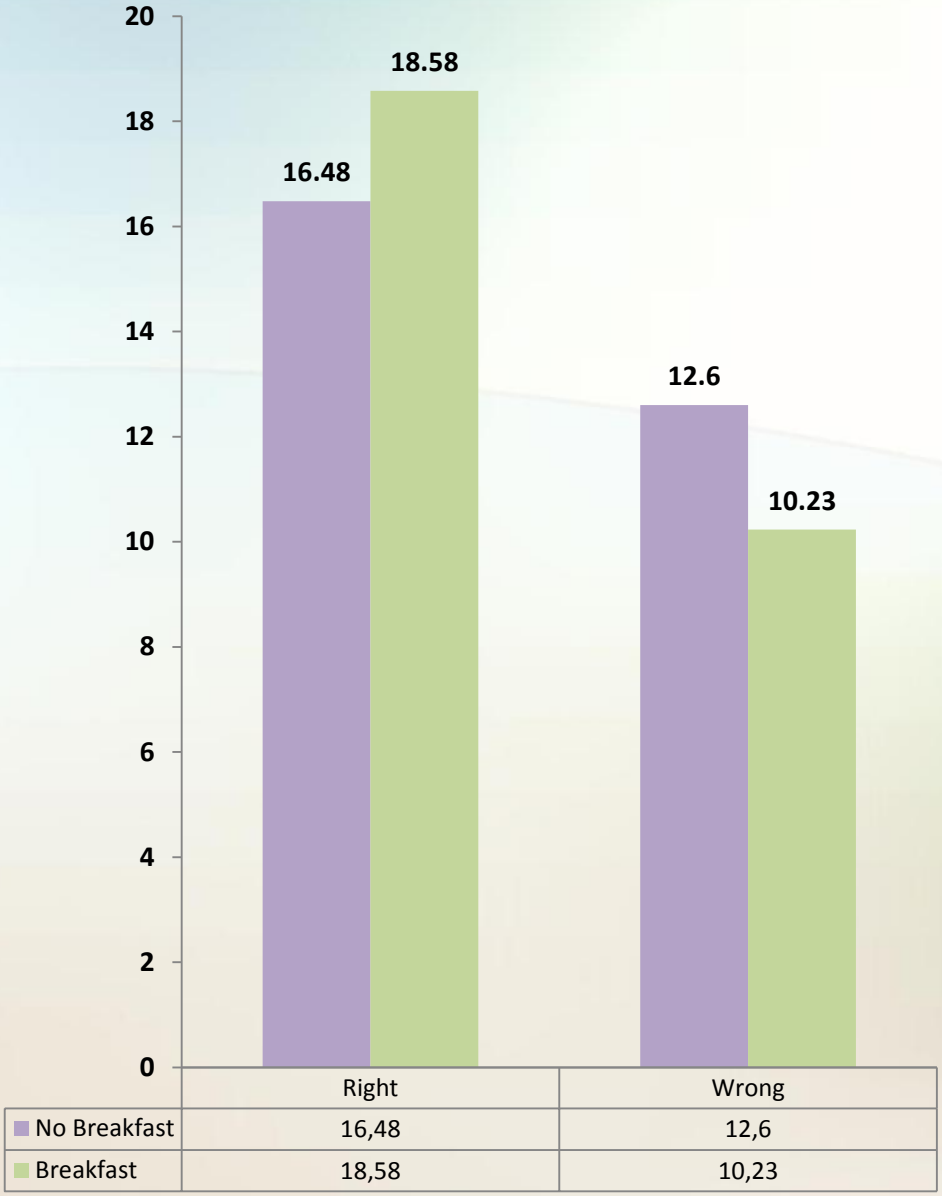
- Children who had a school meal make more right response



	Right	Wrong
No Meal	10,82	19,39
Meal	25,02	2,57

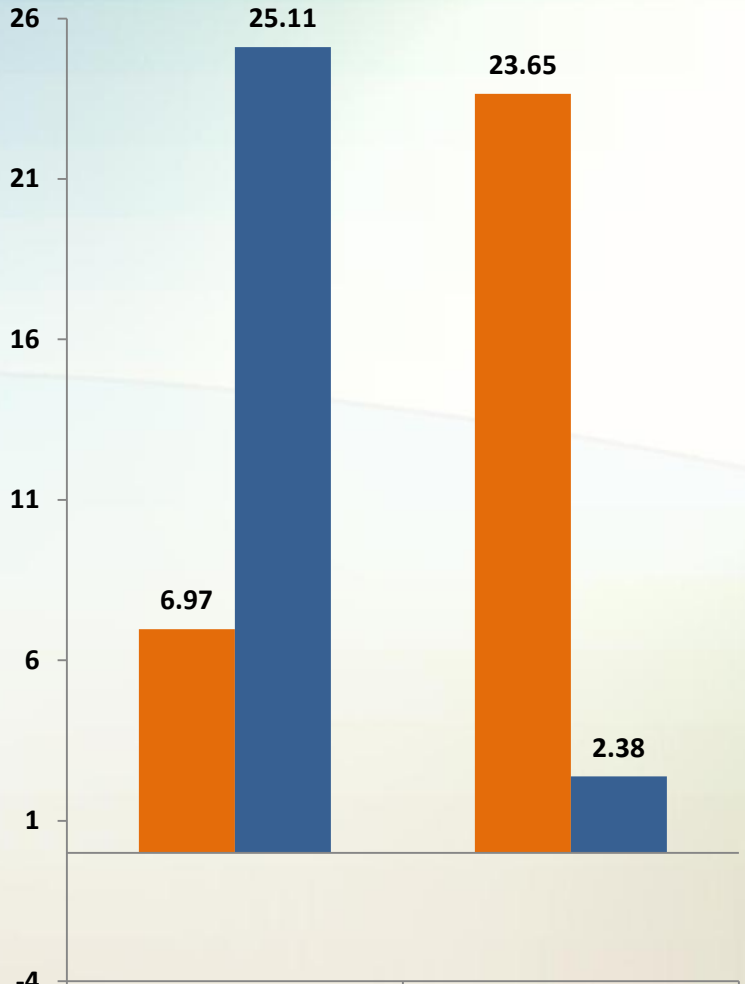
Effect of Breakfast on Auditory Attention

- Children who had a breakfast make more right response



Effect of Breakfast, School Meal & Number of Meals

- Combination of breakfast skippers, no school meal & eating <3 meals/day has a significant lower right response than their peers

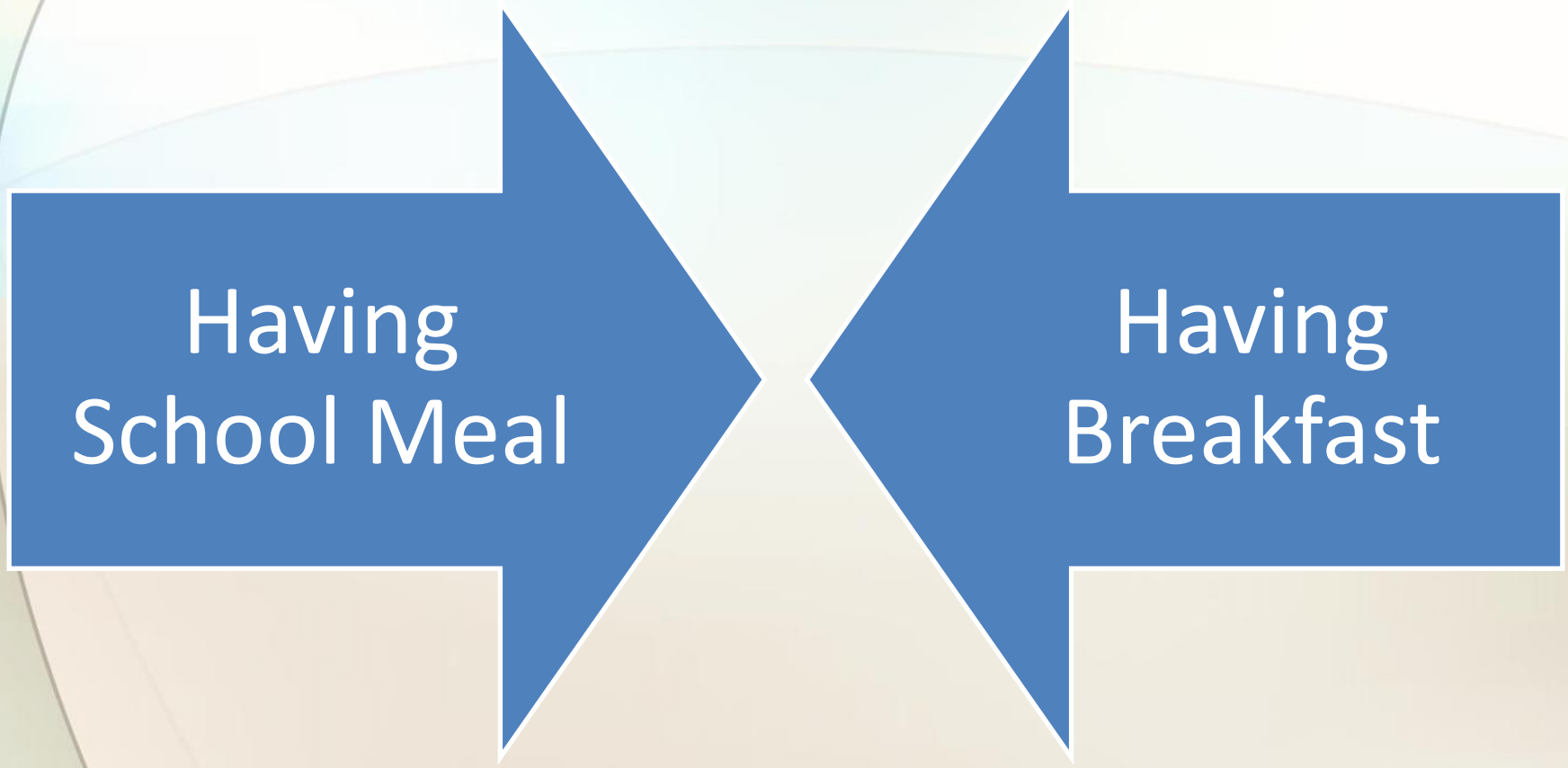


	Right	Wrong
No Breakfast & No School Meal & Number of Meals Less than 3	6,97	23,65
Breakfast & School Meal & Meals 3 or more	25,11	2,38

Auditory Vigilance "B"

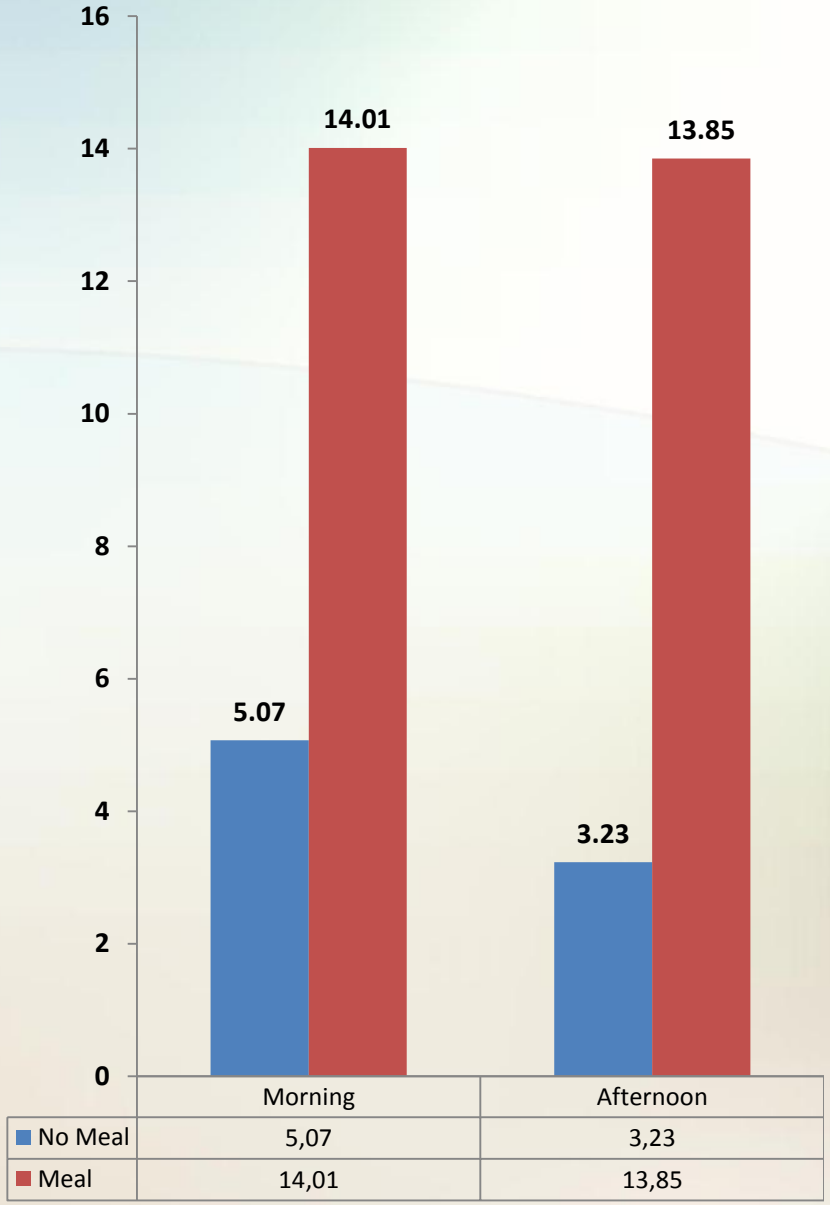
Right Responses

Predictors for Right Responses to Auditory Stimuli in Morning



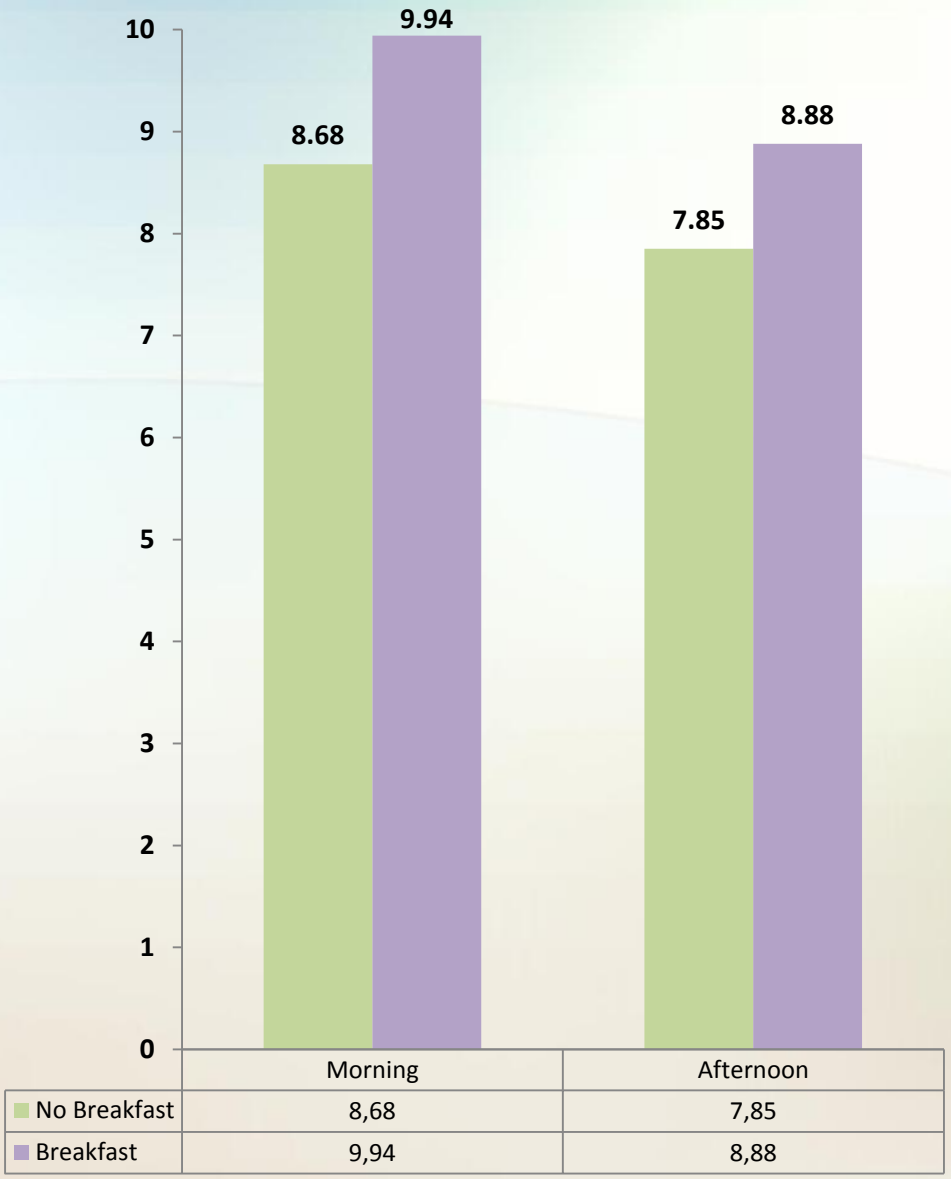
Effect of School Meal

- No meal resulted in less correct response to auditory stimuli at the end of school day than in the morning
- Children who had school meal had no significant difference between morning and afternoon test scores



Effect of Breakfast

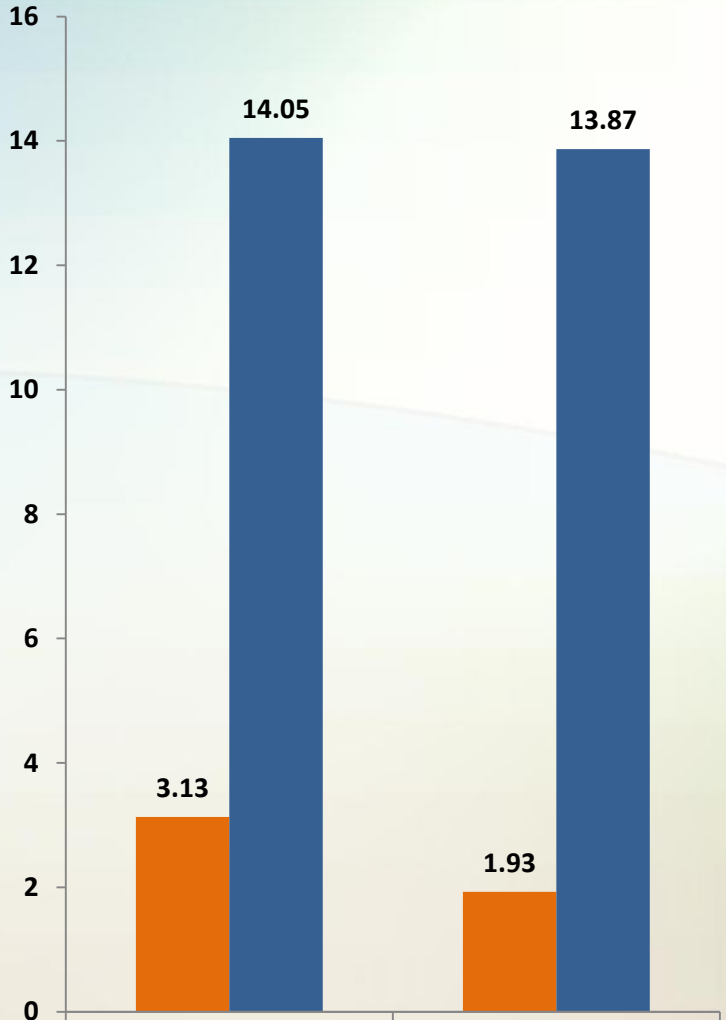
- Children who had no breakfast had less correct response to auditory stimuli at the end of school day than in the morning.



	Morning	Afternoon
No Breakfast	8,68	7,85
Breakfast	9,94	8,88

Effect of Breakfast, School Meal & Number of Meals

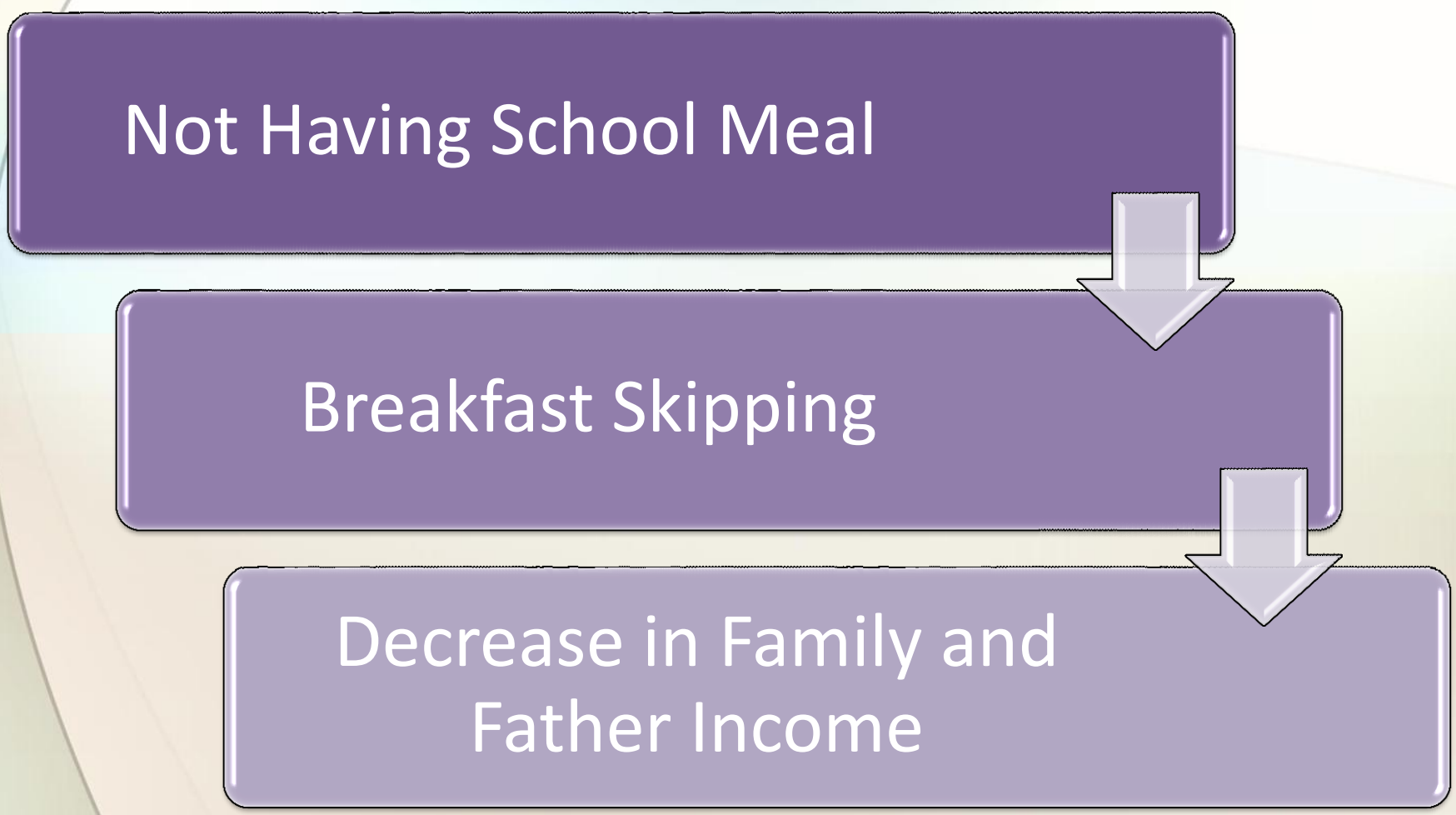
- A combination of no school meal, no breakfast and less than 3 meals per day, negatively affected the test scores of morning and afternoon



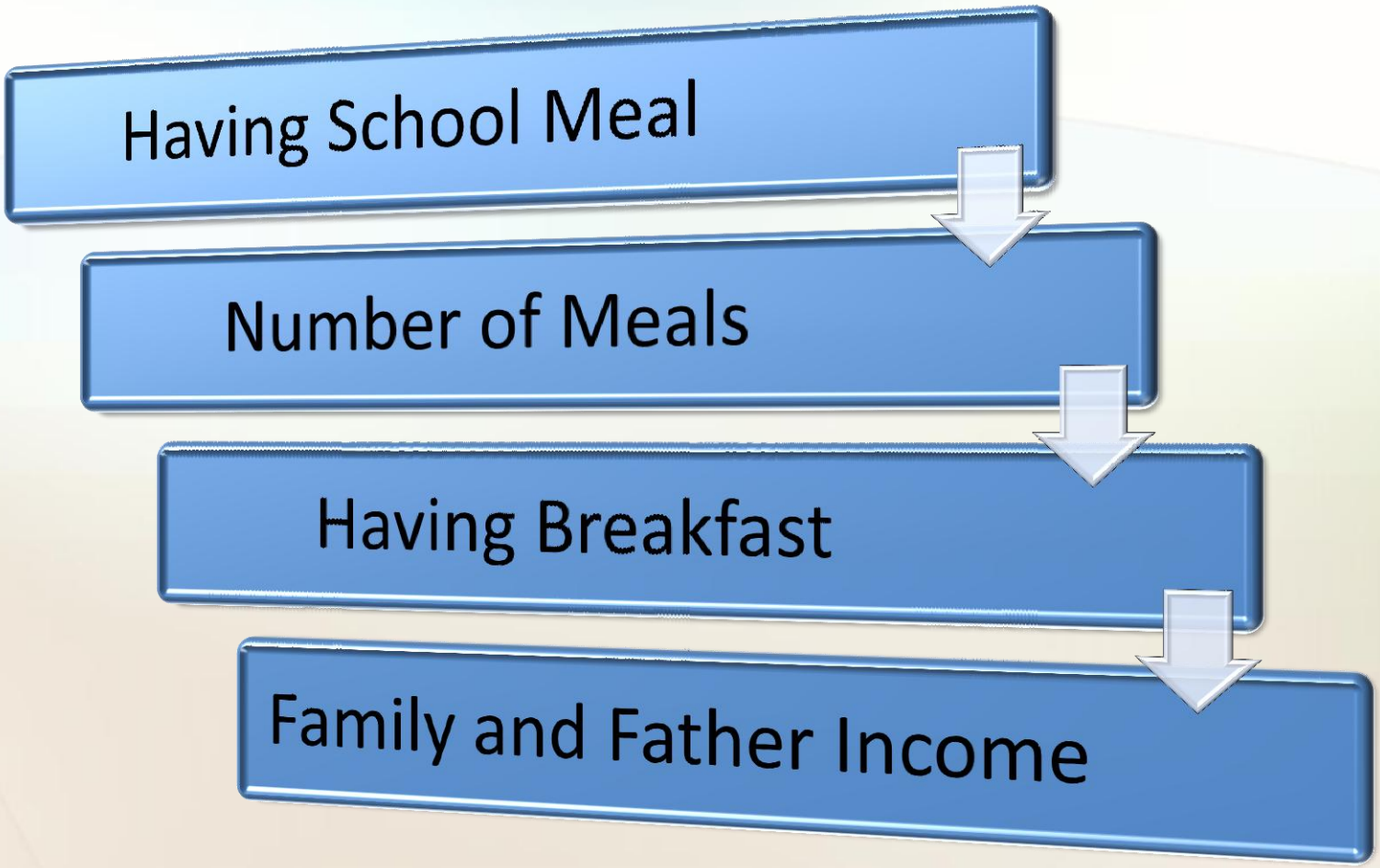
	Morning	Afternoon
No School Meal & Less than 3 Meals	3,13	1,93
School Meal & 3 or more Meals	14,05	13,87

School meal is the most strong predictor of the right responses at the afternoon test .

Predictor for High Wrong Response in the Morning



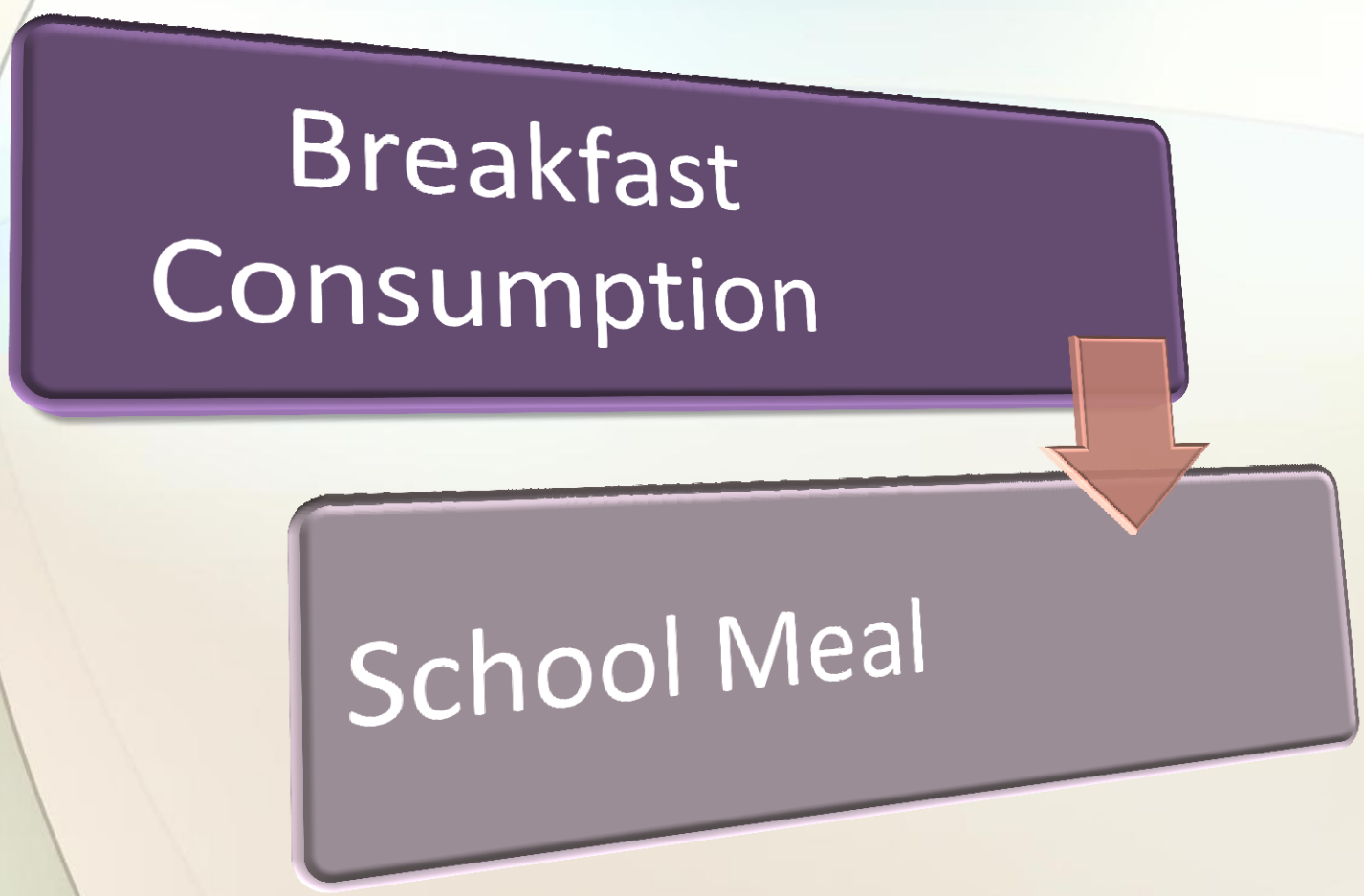
Predictor for Less Wrong Response in the Afternoon



DIGIT SPAN

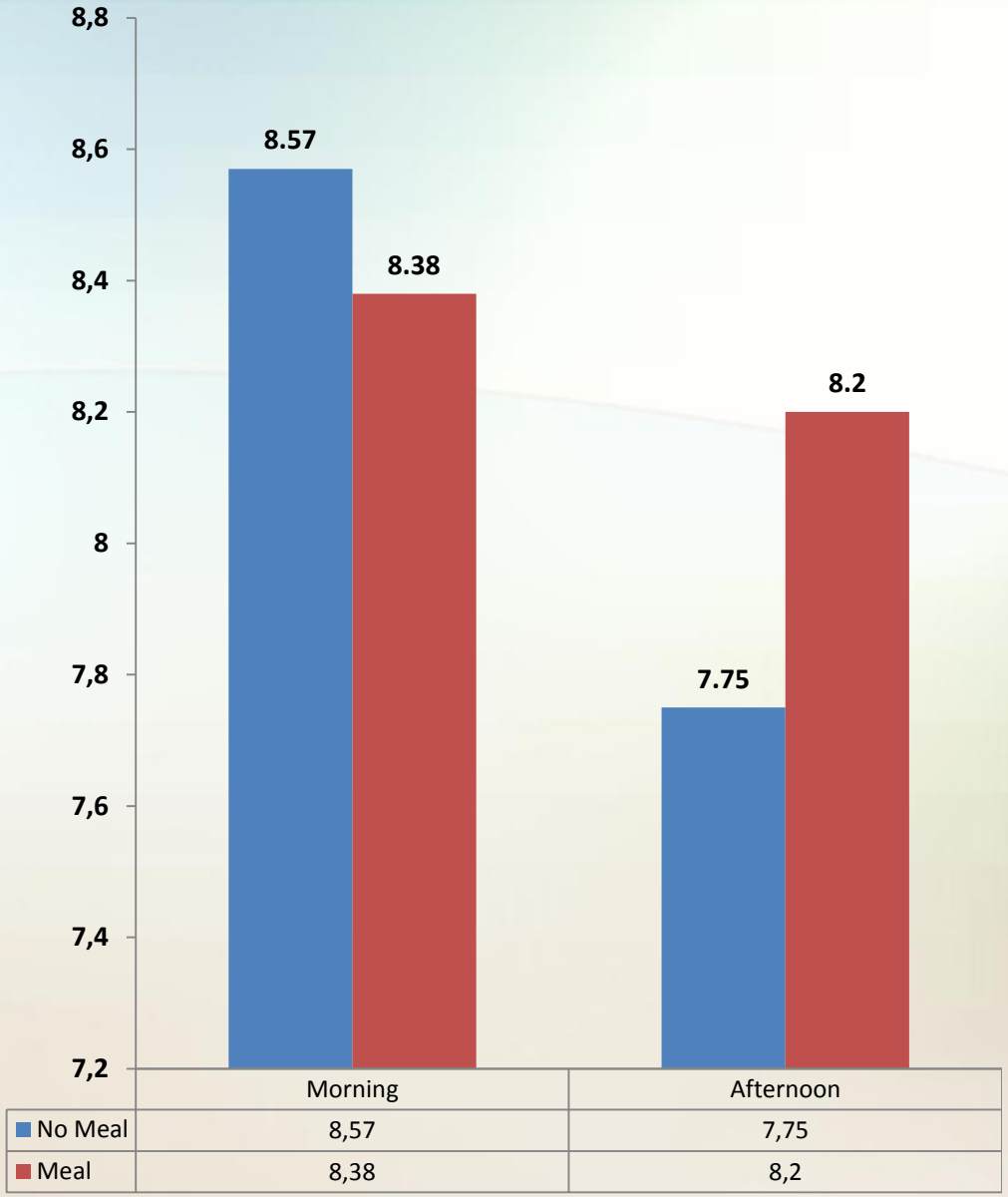
- **Digit Span test assesses children's auditory attention span and the ability to focus on auditory information.**
- **Performance on the test was poorer among children who were micronutrient deficient.**

Predictor for Digit Span Scores in the Morning



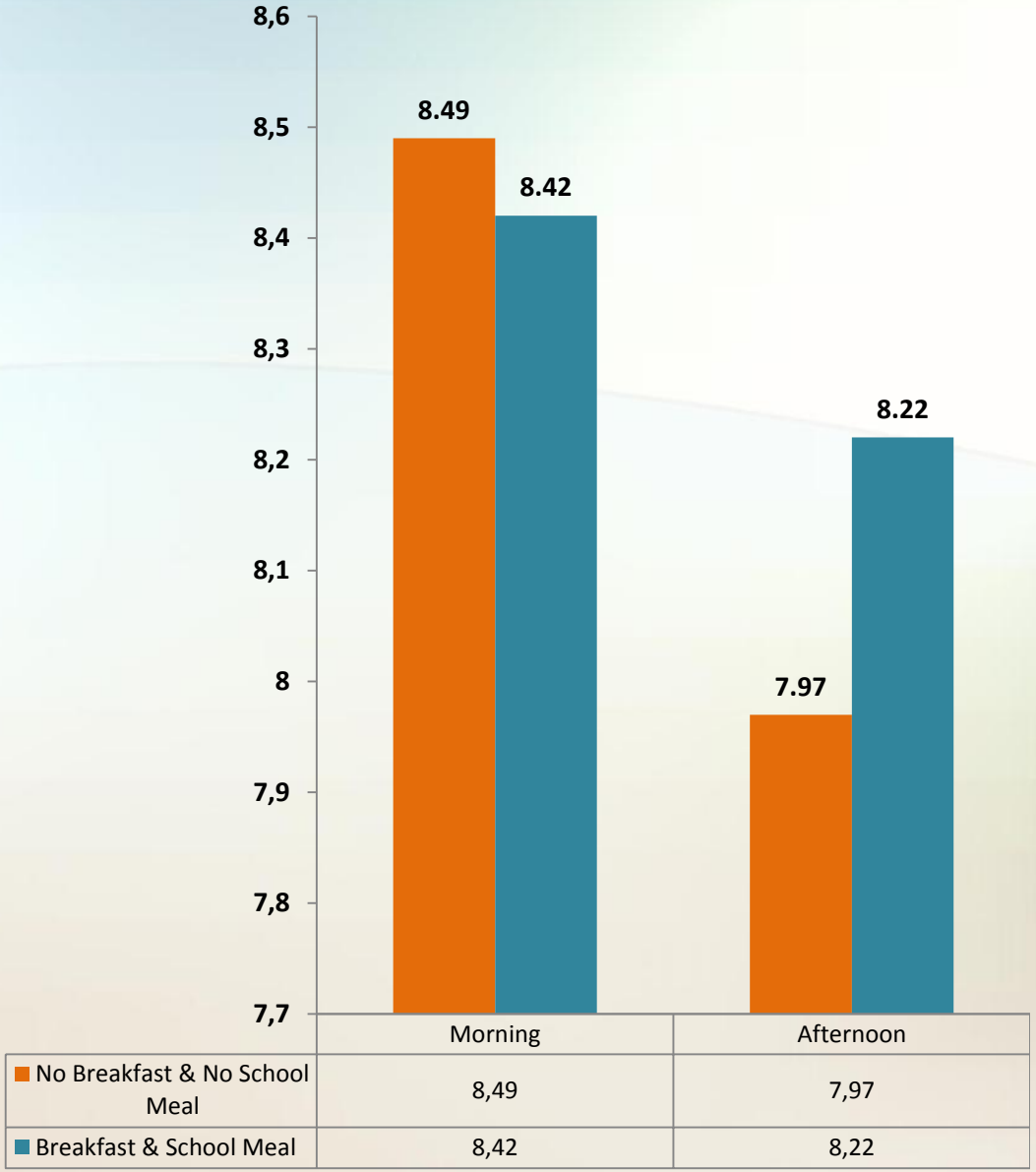
Effect of School Meal

- Children who had no meal had less test scores at the end of school day than in the morning



Effect of School Meal & Number of Meals

- A combination of school meal & number of meals more than 3 , has **significant difference** on the test scores of morning and afternoon



Predictor for Digit Span Scores in the Afternoon

Having School Meal

Increase in Father Income

Higher Mother Education

PREDICTORS OF COGNITIVE FUNCTION

Predictors of Cognitive Function

- Having School Meal
- Having Breakfast
- Small Family Size
- Increase of Family Income
- Higher Mother Education

Conclusion

This means that cognitive performance of school children could be predicted by :

- ***Nutritional factors (having school meal & breakfast)***
- ***Improved enabling environment (small family size, high income & mother education).***


Thank You!