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Quality and Equity of Junior Secondary Education in Indonesia
Findings of Indonesia Family Life Survey Analysis
Preliminary Results

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Findings of IFLS Analysis

In accordance with proceedings of the two Workshops on Equity and Quality in Junior Secondary Education, and of discussions with MOEC and USAID, an analysis has been undertaken of five questions which can inform policy decisions to improve quality and equity at the SMP level. The questions, and their policy relevance, are summarized in section I.

In the time since the last workshop, preliminary analysis has been conducted on the first four questions. These are reported in section II. The report on each question begins with a summary of the relevant data and its characteristics, followed by a discussion of findings.

I. Research questions

The IFLS data is being analyzed to answer the following five questions:

1. What are the differences in labor market outcomes between males and females who have completed the junior secondary level?

The reason for looking at labor market outcomes in categories of employment and in terms of earned income is to determine whether employment patterns change with increased levels of schooling and to what extent higher levels of schooling contribute to increased earnings. Both of these issues can help us to understand the demand for schooling. If higher levels of schooling do contribute to higher earnings and/ or to specific forms of employment, then parents and children are likely to demand schooling. If, however, increased levels of schooling do not "pay off" in the labor market, demand is likely to be weak.

In the context of equity and universal participation in junior secondary education, we are especially interested in knowing whether differences in labor market outcomes between males and females and between those with urban and rural residences decrease, or perhaps, increase, with higher levels of education.

2. At what level of family income does junior secondary education become affordable, for boys and for girls?

This question has direct relevance to making policy decisions in support of nine years compulsory education. With gross enrollment currently in the 40% range at the junior secondary level, it is important to identify the immediate determinants of children's attendance in SMPs. An obvious potential reason is the cost of schooling to families. Thus, this question asks whether there are differences in family income between those children of the appropriate age group who do attend SMPs and those who do not.

The analysis also compares family income of attenders and non-attenders by gender of the child and by urban and rural residence. In other words, it asks whether different levels of family income are associated with SMP attendance for boys and for girls, in urban and rural areas.

3. Does cost of education, particularly variables reflecting transportation, explain the impact of distance on girls' attendance of junior secondary schools?

In the preliminary analysis of the IFLS data conducted by RAND, one factor which was shown to predict girls' enrollment: distance to school. This is a common, though not universal, finding concerning girls' education. The data collected in the IFLS allow us to look a little more closely at this question to understand what it is about distance to school that affects girls' participation. Specifically, we can determine whether or not it is the direct costs associated with distance, such as bus fares, which underlie differences in participation. If cost of transport is a major factor, then appropriate policy would be to provide subsidies. If it is not the cost, then we should be looking for other reasons, such as parental concern for safety, which can be addressed through policies and programs.

4. Do variables related to the school environment, the learning process, teacher training, and educational support predict school quality as assessed by national tests scores at the junior secondary level, for selected provinces?

The IFLS data set includes a survey of 900 SMPs from 13 provinces. The School Facilities Survey collected data about the physical facilities, the principal, one language and one mathematics teacher, and the use of learning materials. The survey also sampled EBTANAS scores in each school, making it possible to calculate average EBTANAS scores in Language and Mathematics and to explore the variation of scores across schools in relation to variation in school environment, school leadership, teacher qualifications and behavior, and the availability of learning materials.

Because EBTANAS scores are not reported by gender of pupil, it is not possible to examine gender differences in achievement. However, it is possible to identify factors associated with higher levels of learning outcomes. This analysis can inform policy on quality improvement. Higher quality education in turn, will create greater demand for schooling among parents and students for both girls' and boys' education.

5. Do variables related to family, schools, and individuals predict boys' and girls' attendance at the junior secondary level, after controlling for urban/ rural differences?

This is the composite model for analyzing the determinants of junior secondary enrollment. It is built from the findings of the above four questions. Analysis is still underway.

II. Analysis and findings

1. What are the differences in labor market outcomes between males and females who have completed the junior secondary level?

A. The Data

For all parts of question one, we looked at data for people between the ages of 11 and 55. The rationale for cutting off the upper part of the age distribution is that the educational opportunities of people who are older than 55 were very different from today's opportunities. Thus, they do not provide a sound basis for prediction. This population was divided into three groups: those with primary education or less; those with junior secondary education and those with senior secondary education. These refer to the highest level of education attained, so university attenders and graduates are not included. Information on employment and earnings was collected by the IFLS for a subset of all adults sampled. Table 1, below, summarizes the composition of the sample. Altogether, 61% of those with recorded employment and income information are men and 39% are women.

Table 1: Distribution of sample by gender and highest level of education

	Primary or less	Junior secondary	Senior secondary	TOTAL
Male	816	364	489	1,669
Female	624	190	268	1,082
TOTAL	1440	554	757	2,751

Comparisons were drawn within and among these groups on three variables: i) Job category; ii) Job field (or sector); iii) Earned income. The classifications for (i) job category are: professional/technical; management/ executive; office worker; sales personnel; service personnel; farm/forestry/game; production line worker; transportation; blue collar; and other. For (ii) Job field, the categories are: agriculture/ fisheries/ forestry; mining; gas/electric; construction; sales; production; finance/ insurance; public welfare; and other.

Each variable was also examined by urban/ rural residence of individuals. Annex 1 contains tables summarizing the distribution by gender and educational level of (i) and (ii). Data for (iii) earned income, is presented below.

B. Findings

i and ii. Job category and job field

At each level of education, nonparametric techniques were applied to determine whether there were significant differences in job categories and job fields between genders and between urban and rural residents. At all levels of education tested, there are significant differences in job category and job field, between genders and between rural and urban residents. Differences are very high at all levels of schooling, testing significant at the .00000 level. These findings show that, while schooling does not create gender differences in employment, it also does nothing to lessen them.

iii. Earned income

The third part of question one looks at the financial outcomes of junior secondary education, in comparison to primary and secondary schooling and distinguished by gender and urban/ rural residence. A simple breakdown of income along these three lines reveals a few oddities in the sample. As noted in Table 2, the males and females with junior secondary education constitute the smallest groups in the total sample. The small number of women junior secondary graduates, may explain the extremely high average income shown for women in rural areas, i.e., the average income of reported for women in this category may be a sampling artifact.

Table 2: Income by education level, gender, and urban/rural residence

	Primary only		**Junior secondary**		**Senior secondary**	
Urban:	**Income**	**N =**	**Income**	**N =**	**Income**	**N =**
Male	330,294	714	478,280	380	480,634	654
Female	394,107	441	757,292	138	756,065	338
Rural:						
Male	369,784	690	383,850	185	439.932	237
Female	182,901	349	591,561	52	355,561	85

Income differences were analyzed using ANOVA techniques. As shown in Table 3, the findings were that among level of education, gender, and urban/rural residence, only level of education significantly predicts differences in earnings.

Table 3: Differences in income by gender, residence, and level of education

	DF	F=	Sig. of F
Total main effects	4	2.25	.061
Gender	1	.82	.364
Urban/ rural residence	1	1.15	.284
Education level	2	2.87	.057

Therefore, while job category and fields vary dramatically by gender and urban/ rural residence, earnings are more strongly influenced by level of education than by gender and residence.

2. At what level of family income does junior secondary education become affordable, for boys and for girls?

A. Data

To answer this question, we constructed an indicator of 'annual per capita family income' by combining all household income sources and dividing by the number of household members. Average household size is six members. The total sample of 12-16 year olds equalled 1,050.

B. Findings

There is a slight difference in income between those families in which 12-16 year olds attend junior secondary, and those in which they do not. The difference is about Rp. 10,000 per person per year; it is not statistically significant.

While no family income differences appears for the population as a whole, there is a statistically significant difference between the income levels of rural families with children in and out of junior secondary school. Rural families with children in junior secondary have significantly higher income than rural families whose 12-16 year olds are not in junior secondary.

Table 4:

3. Does cost of education, particularly variables reflecting transportation, explain the impact of distance on girls' attendance of junior secondary schools?

A. Data

The IFLS records several categories of estimated school expenses: annual expenses, monthly expenses, irregular expenses, and other expenses. Since it is not clear in which category transportation costs would be recorded, and so it is possible that different respondents placed them in different categories, we looked at all expense categories in their relationship to each other and to distance to school. The number of students attending SMP for which there is data on travel time is 790.

B. Findings

There is significant correlation among the 4 categories of school expenses.

There is no correlation between expenses and distance to school.

There are however measurable differences in:

(i) Urban and rural travel time, with time for rural females the highest

Table 5: Urban and rural travel times to SMP (in minutes)

	Urban	Rural
Male	16.5	23.8
Female	17.8	24.4

(ii) Annual fees; they are highest for rural girls and lowest for urban girls

Table 6: Annual school fees for SMP students, by gender and residence (in rupees)

	Urban	Rural
Male	223	115
Female	80	435

4. Do variables related to the school environment, the learning process, teacher training, and educational support predict school quality as assessed by national tests scores at the junior secondary level, for selected provinces?

A. Data

The IFLS includes a school facilities survey for a smaple of schools in each enumeration area included in the houseehold survey. Table 7 summarizes the distribution of sampled SMPs across provinces.

Table 7: Distribution across Provinces of Sampled SMPs

Province	Number of Schools	Percent of Sample
North Sumatra	78	8.7
West Sumatra	44	4.9
South Sumatra	45	5.0
Lampung	32	3.6
Jakarta	111	12.3
West Java	143	15.9
Central Java	108	12.0
Yogyakarta	58	6.4
East Java	127	14.1
Bali	35	3.9
NTB	45	5.0
South Kalimantan	34	3.8
South Sulawesi	40	4.4
TOTAL	900	100.0

Because EBTANAS scores are normed within provinces, it was necessary first to analyze factors related to EBTANAS within provinces. We chose to work with three Javanese provinces, Jakarta, West Java, and East Java, and with the province with the largest sample outside of Java,

which is North Sumatra. The same analyses were conducted within each of these four provinces; results, not surprisingly, differed among the four provinces. Following the provincial-level analysis, EBTANAS scores for schools were standardized across the four provinces and regression analysis was performed for the composite set.

The analysis examined four sets of variables in relation to learning outcomes as measured by the EBTANAS: 1) School environment; 2) Teacher variables; 3) Learning process variables; 4) Professional support variables. The specific variables included in each of these categories are summarized below along with their distribution in the national sample of 900 SMPs.

1. School environment

"School environment" refers to both the physical and social environment of the school.

i. institutional organizer: Includes Ministry of Education and Culture; Ministry of Religious Affairs, and Private Foundations. Nationwide, the SMPs sampled fell into the following distribution:

Table 8: Organizers of sampled SMPs

Organizer	Number	Percent
Ministry of Education and Culture	482	53.6%
Ministry of Religious Affairs	50	5.6%
Private Foundation	359	39.9%
Other	9	1.0%

ii. Extracurricular Facilities: Presence or absence of library, sports field, sports equipment, health efforts, canteen, and auditorium. Virtually all schools sampled have sports equipment and 90% have libraries; only 15-20% lack sports fields or health efforts. Nearly 60% have canteens, while only 22% of the SMPs have auditoriums.

iii. Classroom facilities: Five variables reflect classroom facilities. They are presence of teacher desk, and of chalk and blackboard; adequacy of lighting; type of floor; and occurrence and degree of leaking and flooding in rainy season. 99% of classrooms in the sampled schools do have teacher desks and blackboards with chalk. There is more variation in type of flooring and leaking or flooding in the rainy season, with more than 20% reporting leaking or flooding.

iv. Class size and attendance: Three variables measure class size, average attendance, and percent of attendance, for each of the math and language classes sampled.

2. Teacher variables

For each math and language teacher sampled, we identified six variables as possible determinants of EBTANAS scores. They are:

i. Gender of teacher The following table summarizes teacher gender for both subjects in sampled SMPs.

Table 9: Gender of sampled SMP teachers

Subject	Male	Female
Language	462	397
Mathematics	640	212

ii. Teacher training -- 88% of math teachers and 91% of language teachers have completed the appropriate level of teacher training.

iii. Year of graduation from highest level

iv. Number of years teaching -- The mean years of teaching for language teachers is 12.6; for math teachers, mean years of teaching is 11.9.

v. Long-term training in past 5 years -- 19% of language teachers and 29% of math teachers have received long-term training in the past 5 years. For language teachers, this is equivalent to the number of teachers with five or fewer years experience; for math teachers, the percent with long-term training exceeds the percent with five or fewer years of experience.

vi. Short-term training in past 5 years -- The majority of teachers -- 55% of language and 57% of math teachers -- report participation in short-term training over the past five years.

3. Learning process variables

One of the unique features of the IFLS school survey is that it provides quantitative indicators of classroom process variables which are believed to effect learning outcomes. We selected 8 variables in two categories for analysis.

i. Supplementary materials use: teachers were asked whether or not they used worksheets, additional textbooks, other books, demonstration tools, or other supporting materials in their

teaching. Large numbers of language teachers reported using all of the supplementary materials except for demonstration tools.

ii. Textbook availability: Teachers were also asked how many students did not possess the textbooks; how many did not have textbooks to take home; and how many could borrow textbooks. Teachers reported that 62% of language students and 56% of math students had textbooks of their own. 77-78% of students were said to be able to borrow such books when needed.

*4. **Professional support variables***: this category primarily refers to the school principal's characteristics and activities, with one teacher variable. The following 6 variables are included:

i. Gender of principal --89% sampled are male, with 11% female.

ii. Principal has received teacher education -- 78% have received teacher training; 22% have not.

iii. Hours per week that principal works at another job -- 69% reported no outside work. The remaining 95 reported from 1-45 hours worked per week in other jobs.

iv. Training of principle in past 5 years -- 610 reported receiving training in the past 5 years, while 275 had not.

v. Principal organizes regular meetings with parents -- Only 43 principals reported that they did not meet regularly with parents.

vi. Number of hours that (math or language) teacher works weekly at outside job -- larger numbers of teachers than principals reported working outside jobs. 24% of language and 35% of math teachers reported working at other jobs, averaging around 15 hours per week.

B. Findings

For each of the four sets of variables, regression analysis was performed within the four selected provinces and on a composite of the four provinces. The average language and math scores for each school constituted the dependent variables. The independent variables are those discussed above. Summaries of the findings by variable set and province are contained in the tables in Annex 2.

Among the eight analyses (four each for language and math) conducted for each province, only West Java registered significant findings in every analysis. For Jakarta, three of the eight analyses showed significant relationships. These were for Teacher variables for mathematics, and Professional Support variables for both language and mathematics. In East Java, only two

analyses showed significance, Environmental and Learning Process factors, both for language. Only one analysis was significant for North Sumatra, and it seems a bit anomalous. It was for Environmental factors and language achievement.

However, across the four provinces, each of the four sets of variables showed significant correlations with both language and mathematics achievement. Environmental factors explained the greatest portion of variance, followed by Learning Process, Teacher, and Professional Support variables. The findings of the composite analysis are discussed below.

1. Environmental Factors

Across the four provinces, it is clear that both language and mathematics achievement tend to be higher in MOEC schools, and lower in MORA and private schools. These differences registered especially in West and East Java.

The negative relationship between the presence of certain school facilities and achievement begs for an explanation. The presence of a canteen correlates negatively with both math and language achievement in the composite sample, but not at a significant level in any of the four provinces. The variation in number of schools with or without canteens seems to be highest in Jakarta. Schools with such facilities might be presumed to have more resources than schools without, which would lead one to expect higher scores. It is possible that instead, the presence of such facilities and equipment represents a choice of investment which does not necessarily lead to improved learning. This issue calls for further analysis.

2. Learning process variables

Learning process variables had the second highest explanatory power. The findings here support the importance of textbooks for learning achievement. Both math and language achievement are significantly and negatively related to the number of children lacking textbooks. Of course, lack of textbooks also reflects poverty and isolation of schools.

Surprisingly, the use of certain support materials and tools registers negative correlations with learning achievement. In particular, teacher use of 'demonstration tools" appears to be negatively associated with language scores. This finding leaves one to wonder what, exactly, teachers consider to be "demonstration tools." Does teacher use of "demonstration tools" imply a lack of active participation by students?

3. Teacher variables

Caution must be exercised in the interpretation of teacher variables in the IFLS in relation to student achievement. For each school, one mathematics and one language teacher were

surveyed. Student EBTANAS scores were averaged across the class 3 population. It is possible, especially in larger schools, that the individual teacher surveyed did not in fact teach all of the students surveyed.

These caveats need to be applied to the findings of the composite analysis, particularly that female language teachers are associated with higher language scores. The other significant finding, that teacher years of experience is positively correlated with both language and math scores, seems less contentious. The presence of experienced teachers may provide support for all teachers in a subject area.

4. Professional support variables

For the composite model, professional Support variables on the whole had the lowest, though still significant, explanatory power. One factor that stands out particularly is the negative relationship between outside employment of teachers and math achievement. Similar negative correlations are found for both Jakarta and West Java.

Table 1: Distribution by education level and job category

		Prof/ Tech	Mgmt/ Exec	Office worker	Sales	Service	Farm/ Forest/ game	Prod. Line	Trans-port	Blue Collar	Other	TOTAL
Primary or less	Male	18	3	3	83	80	317	81	22	189	15	811
	Female	4	1	2	95	114	153	141	0	96	14	620
Junior secondary	Male	17	2	5	54	75	73	45	20	67	4	362
	Female	7	1	4	42	28	37	50	0	15	6	190
Senior Secondary	Male	69	11	28	75	105	62	54	18	55	6	483
	Female	35	12	37	58	65	16	34	4	8	0	269

Table 2: Distribution by education level and job field

		Ag/ Fish/ Forest	Mining	Manufac-turing	Utilities	Constr uction	Trade	Produc-tion	Finance/ Insurance	Public Welfare	Other	TOTAL
Primary or less	Male	371	19	63	0	88	117	55	23	45	32	813
	Female	171	6	110	0	9	124	2	10	120	65	617
Junior secondary	Male	78	4	50	5	41	60	47	14	34	23	356
	Female	39	0	36	1	1	55	0	4	37	17	190
Senior Secondary	Male	64	3	81	21	28	85	41	36	104	18	481
	Female	19	0	36	1	3	81	3	24	91	8	266

ENVIRONMENTAL FACTORS

Province	Total Variance Explained	Significance of Regression	Significant variables	Direction of Effect	Significance of variables
North Sumatra					
Language	44%	.006	No single factor		
Mathematics	27%	NS			
Jakarta					
Language	24%	NS			
Mathematics	24%	NS			
West Java					
Language	33%	.000	Organizer: MOEC	positive	.001
			Organizer: MORA	negative	.003
			Rain splashes in rainy season	positive	.051
Mathematics	24%	.005	Organizer: MORA	negative	.01
			Organizer: Foundation	negative	.001
			Has auditorium	negative	.03
East Java					
Language	32%	.006	Organizer: Foundation	negative	.011
			Has auditorium	negative	.022
			Has sports field	negative	.025
			Attendance rate	positive	.033
Mathematics	18%	NS			
Composite					
Language	18%	.000	Organizer: MOEC	positive	.000
			Has canteen	negative	.034
Mathematics	11%	.000	Organizer: MORA	negative	.025
			Organizer: Foundation	negative	.000
			Has auditorium	negative	025
			Has canteen	negative	.001

TEACHER VARIABLES

Province	Total Variance Explained	Significance of Regression	Significant variables	Direction of Effect	Significance of variables
North Sumatra					
Language	15%	NS			
Mathematics	10%	NS			
Jakarta					
Language	15%	NS			
Mathematics	13%	.059	Teacher's graduation year	negative	.046
West Java					
Language	15%	.0003	Female language teacher	positive	.046
			Teacher years of experience	positive	.033
Mathematics	15%	.002	Recent long-term training	negative	.014
			Teacher years of experience	positive	.017
East Java					
Language	8%	NS			
Mathematics	10%	NS			
Composite					
Language	6%	.001	Female language teacher	positive	.0001
			Teacher years of experience	positive	.03
Mathematics	7%	.0002	Teacher years of experience	positive	.02

LEARNING PROCESS VARIABLES

Province	Total Variance Explained	Significance of Regression	Significant variables	Direction of Effect	Significance of variables
North Sumatra					
Language	6%	NS			
Mathematics	17%	NS			
Jakarta					
Language	10%	NS			
Mathematics	5%	NS			
West Java					
Language	24%	.0000	Number of students without text	negative	.024
Mathematics	17%	.0004	Number of students without text	negative	.004
			Use of demonstration tools	negative	.097
East Java					
Language	29%	.000	Use of demonstration tools	negative	.0002
			Use of supporting texts	negative	.018
Mathematics	10%	NS			
Composite					
Language	13%	.000	Number of students without text	negative	.000
			Use demonstration tools	negative	.067
Mathematics	6%	.002	Number of students without text	negative	.0006

PROFESSIONAL SUPPORT VARIABLES

Province	Total Variance Explained	Significance of Regression	Significant variables	Direction of Effect	Significance of variables
North Sumatra					
Language	6%	NS			
Mathematics	12%	NS			
Jakarta					
Language	27%	.0001	Recent training of principal	negative	.000
			Female principal	positive	.01
Mathematics	19%	.004	Recent training of principal	negative	.005
			Hours of other employment, math teacher	negative	.035
West Java					
Language	11%	.022	Hours of other employment, language teacher	negative	.042
Mathematics	10%	.042	Hours of other employment, principal	negative	.032
East Java					
Language	10%	NS			
Mathematics	4%	NS			
Composite					
Language	4%	.03	No single factor		
Mathematics	3%	.041	Hours of other employment, math teacher	negative	.018