

Teacher Special Hardship Allowance - School Hardship Index

Technical note

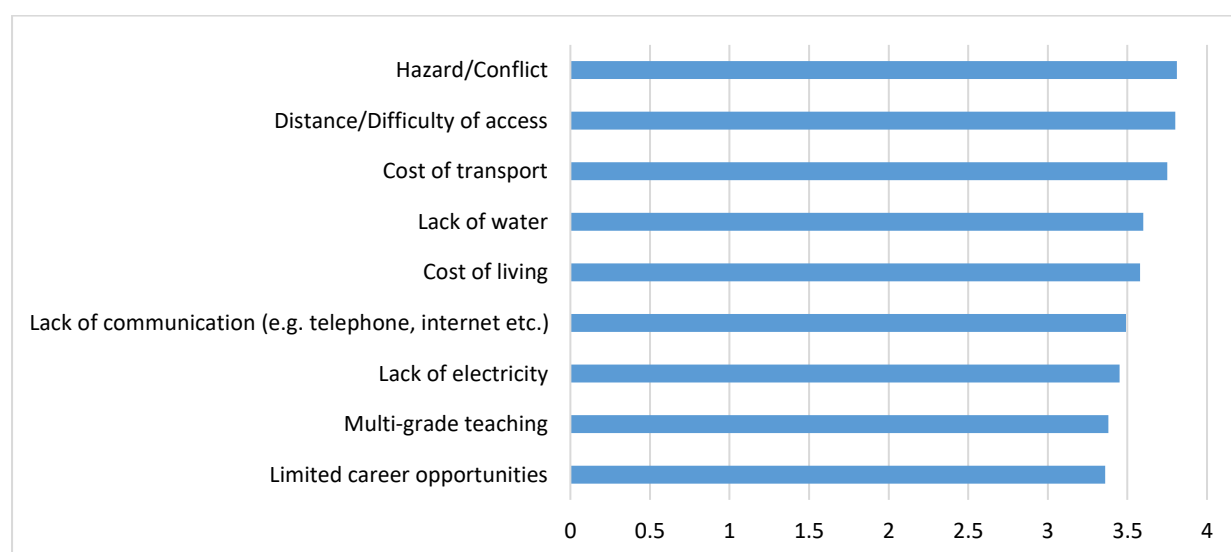
This short note is intended to describe the analytical process which resulted in the design of the School Hardship Index and its utilization for the determination of the Teacher Special Hardship Allowance.

1. Principles

The current policy in relation to teacher hardship payments is outlined in the Department of Budget and Management's National Budget Circular No. 514 December 5, 2007. Along with Multi-grade teachers, Mobile teachers and Non-formal Education or Alternative Learning System (ALS) Coordinators, Classroom teachers in elementary and secondary schools and school heads/administrators assigned to a hardship post qualify for the Special Hardship Allowance (SHA). In that context, a hardship post is defined as a public school or community learning center located in an area characterized by Transport Inaccessibility and/or Difficulty of Situation (calamities, hazards, etc.). In practice however, the SHA has been granted through a decentralized process, taking account only of remoteness, but in very diverse ways throughout the country¹.

In order to introduce a more standardized approach, which would promote efficient and equitable use of resources, the School Hardship Index was designed to be a proxy of the hardship faced by teachers in schools in difficult environments, according to the two areas mentioned above. This index would be used to determine the level of Hardship Allowance associated to a teaching position, with an objective to incentivize more experienced teachers to work in hardship areas and thus promote equity. The development of the index was therefore guided by an analysis of the presence of more experienced teachers according to various characteristics of the schools. In addition, face-to-face and online consultations of teachers were conducted to gather teachers' opinions about the most difficult aspects of being posted in some schools.

The results in the figure below, illustrate how all factors were recognized as being between important or very important (respondents were asked to rate each of the below factors as 1= "Not important at all", 2="Not very important", 3="Important", or 4="Very important")¹.



¹ Please refer to the Special Hardship Allowance Option Paper for more details.

2. Data

The choice of data used for the analysis was guided by two criteria:

- The description of the conditions of living and teaching, including but not limited to the dimensions identified by the consultation, and
- The availability of up-to-date data at a disaggregated enough level (school level whenever possible, municipality level when relevant).

2.1. Content and sources

The data used for the analysis included all public primary and secondary schools, for which the number of students and teachers by salary grade, as well as all relevant information, was collected from EBEIS. In addition, complementary information on the location of the school was requested from the related entities e.g. crime rates, poverty levels etc.

Finally, to conduct the budget simulations, the average salary levels of teachers, by grade, was obtained from Department of Education. The summary of data and sources is provided in the table below:

Indicator	Breakdown	Disaggregation level	Source
Students and teachers			
Number of students	-	School	EBEIS
Number of teachers	Salary Grade	School	EBEIS
School Information			
Region	-	School	EBEIS
Municipality	-	School	EBEIS
School level (Primary/Highschool)	-	School	EBEIS
Multigrade	-	School	EBEIS
Distance			
Travel distance to division office	-	School	EBEIS
Travel cost to division office	-	School	EBEIS
Travel time to division office	-	School	EBEIS
Poverty and vulnerability to disasters			
Poverty incidence	-	Municipality	PSA
Number of human induced hazard incidents	-	School	EBEIS
Number of natural hazard incidents	-	School	EBEIS
Number of violent acts	-	School	EBEIS
Need for temporary learning spaces due to natural disasters	-	School	RADaR
Classroom damages		School	RADaR
School belongs to the Geographically Isolated and Disadvantaged Areas (GIDA)			Department of Health
Lack of Amenities			
Absence of water	-	School	EBEIS
Absence of electricity	-	School	EBEIS
Absence of internet	-	School	EBEIS

2.2. Data cleaning

In order to prevent extreme values from distorting the analysis, outliers were removed from the dataset. Details of the data trimming is specified below:

Indicator	Average	Maximum value observed in dataset	Maximum value cut-off	Number of outliers deleted
Travel cost to division office (in Pesos)	144	9,999.99	5,350	644 (1.4%)
Travel time to division office (in minutes)	128	72,021	2,880	672 (1.4%)
Number of human induced hazard incidents	0.30	108	20	571 (1.2%)
Number of natural hazard incidents	1.91	47	20	614 (1.3%)
Number of violent acts	0.14	72	46	1 (0.0%)

3. Econometric Analysis

An econometric analysis was conducted to identify factors associated with a lower availability of teachers (compared to the number of students) and a lower availability of more experienced, higher level teachers. The analysis suggested that, all other things being equal, primary schools without electricity, schools subject to natural disasters, and those further from the Division Office also have PTRs than other schools. In addition, primary schools further from the Division Office those with no electricity, no water or no internet, and in poorer areas have a significantly smaller proportion of Teacher II or above teachers². Even when controlling for all these explanatory factors important disparities were still observed between regions.

A similar analysis was conducted, covering both primary and high schools, focusing on the availability of teachers of Teacher II level or above. The results, presented below, are consistent with the analysis on primary schools only, and justify a unified approach for both education levels.

3.1. The model

The model, after removing the variables which did not appear to have a significant association with the percentage of higher level teachers, is as follows:

$$\begin{aligned} \text{Percentage of Teachers II or above teachers}^3 = & \text{Constant} \\ & + \text{Coefficient 1 x } \textit{High School} \\ & + \text{Coefficient 2 x Travel cost to division office} \\ & + \text{Coefficient 3 x Travel time to division office} \\ & + \text{Coefficient 4 x Poverty incidence} \\ & + \text{Coefficient 5 x Number of violent acts} \\ & + \text{Coefficient 6 x } \textit{No electricity} \\ & + \text{Coefficient 7 x } \textit{No water} \\ & + \text{Coefficient 8 x } \textit{No internet} \\ & + \text{Coefficient 9 x } \textit{Temporary learning spaces needed} \end{aligned}$$

² Cf. Special Hardship Allowance Option Paper for more details.

³ Including Head teachers. The variables in italics are yes/no markers

3.2. Results

The results of the linear regression are shown in the table below:

Number of observations = 40,164

R-squared = 0.1604

Adjusted R-squared = 0.1602

Variables	Coefficient	Std. Err	t	P> t	[95% Confidence Interval]	
High School	-0.1217898	0.0035780	-34.04	0.000	-0.1288028	-0.1147768
Travel cost to division office (in Pesos)	-0.0000459	0.0000065	-7.09	0.000	-0.0000586	-0.0000332
Travel time to division office (in minutes)	-0.0001902	0.0000128	-14.86	0.000	-0.0002153	-0.0001651
Poverty incidence (in %)	-0.0032689	0.0000931	-35.1	0.000	-0.0034515	-0.0030864
Number of violent acts	-0.0037111	0.0014279	-2.6	0.009	-0.0065098	-0.0009125
No electricity	-0.1692699	0.0056589	-29.91	0.000	-0.1803615	-0.1581784
No water	-0.0623623	0.0038874	-16.04	0.000	-0.0699817	-0.0547429
No internet	-0.0602367	0.0030228	-19.93	0.000	-0.0661614	-0.0543120
Temporary learning spaces needed	-0.0118931	0.0048515	-2.45	0.014	-0.0214021	-0.0023841
Constant	0.6211166	0.0030841	201.39	0.000	0.6150716	0.6271615

3.3. Interpretation

Although the model explains only a relatively small part (16%) of the variations in the percentage of higher level teachers between schools, strong links are identified between the variables listed in the model above and the proportion of higher level teachers. These are more present in primary schools than in high schools (in proportion), and in schools which are closer to their division office, in wealthier areas, with fewer violent acts, or with electricity, water and internet.

4. From analysis to the School Hardship Index

The School Hardship Index was drawn directly from the results of the analysis, based on the assumption that higher level teachers are deterred from being posted in certain schools because of the hardship aspects considered in the model. The index is thus built in a way that it is comprised between 0 and 100%, 0 representing the situation of a school without any of the hardship aspects, and 100% that of a school with the most hardship conditions observed.

Thus, a hypothetical school with the maximum value on each variable would get the maximum hardship score. The relative contribution of each variable to this maximum hardship value determines the variable's weight.

Variable	Regression coefficients	Maximum value (after data cleaning)	Variable contribution to maximum hardship score (Coefficient*Max value)	Variable weight (relative contribution to maximum hardship score)
Travel Cost to Division	-0.0000459	5350	-0.245565	16%
Travel Time to Division	-0.0001902	2880	-0.547776	35%
Poverty incidence	-0.0032689	84.76	-0.27708044	18%
Violent Acts	-0.0037111	46	-0.1696112	11%
No electricity	-0.1692699	1	-0.1692708	11%
No water	-0.0623623	1	-0.0623601	4%
No internet	-0.0602367	1	-0.0602364	4%
Temporary learning spaces needed	-0.0118931	1	-0.0118933	1%
		Total hardship score	-1.54379324	100%

In practice, the maximum hardship scores of each quantitative variable (i.e. not including the electricity, water, internet and temporary learning spaces need markers) are given to all schools amongst the 1% highest values (the 99th percentile) for that variable. All other schools are given a score for each variable that is the percentage of the school's value for that variable compared to the 99th percentile. These variable scores are then aggregated with the corresponding variable weights to give the school's Hardship Index. An example is given in the table below:

Variable	Variable weight (a)	99th percentile (b)	School's values (c)	Variable score d = (c/b)	Contribution to Hardship Index (d) x (a)
Travel Cost to Division	16%	1,150	500	43%	7%
Travel Time to Division	35%	635	300	47%	17%
Poverty incidence	18%	73%	50%	69%	12%
Violent Acts	11%	3	2	67%	7%
No electricity	11%	1	0	0%	0%
No water	4%	1	0	0%	0%
No internet	4%	1	1	100%	4%
Temporary learning spaces needed	1%	1	1	100%	1%
				Hardship Index	48%

5. Using the Hardship Index to calculate the Special Hardship Allowance

As the Hardship Index is built as a proxy of how deterring the characteristics of schools are for experienced teachers to be deployed there, the Special Hardship Allowance is determined on the basis of a school's Hardship Index.

In accordance with the Magna Carta and the 2007 budget circular, the SHA is to be allocated as a percentage of the teacher's or the staff's salary rather than in nominal terms. In addition, because it is to compensate for hardship faced by teachers in a specific area. In consequence, all teachers and staff in a given schools, being exposed to the same conditions, are to receive the same percentage of SHA.

For reasons of easiness of implementation and communication, the SHA is determined by categories, using thresholds. Below are the thresholds and categories of SHA established for the 2018 budget simulations.

Hardship Index value categories	SHA amount
$0 \leq \text{Index} < 0.29$	0
$0.29 \leq \text{Index} < 0.40$	10%
$0.40 \leq \text{Index} < 0.50$	15%
$0.50 \leq \text{Index} < 0.60$	20%
$0.60 \leq \text{Index}$	25%

6. Budget simulation

The above thresholds and SHA amounts were established using budget simulations, to ensure that the total amounts resulting from those parameters were in line with the budget allotments or expected increase. To that end, the same dataset used for the analysis is associated with the average salaries for each teacher level. The salary paid in each school is thus estimated by adding the salaries for each teacher's level. The characteristics of the schools are then used to calculate the Hardship Index of each school, and the SHA percentage determined. The SHA amount is finally calculated for each school as the product of the total estimated salary by the SHA percentage, and aggregated at the regional and national levels.

7. Future adjustments and improvements

The version of the School Hardship Index and Teacher Special Hardship Allowance outlined in this document was developed at a particular point in time with a particular set of available data. It should not be viewed as **the** definitive version. The specifics of the index should be revisited (and revised) as the context changes, as the available data also change and as the available SHA budget varies. The elements which should be regularly revisited are:

- The variables to include in the teacher hardship index and their related outlier cut-off points
- The econometric analysis to identify which are significantly associated with the proportion of higher level teachers in schools
- The relative weights of the significant variables and their 99th percentile values
- The hardship index value categories and their related SHA amounts