ARTICLES

AVERAGE REMUNERATION AS AN INDICATOR OF TEACHER MARKET VALUE IN THE LABOR MARKET

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ABSTRACT

This article seeks to analyze teachers' average remuneration (AR) in the public basic education networks and the ratio between their ARs and that of other professionals in the labor market, having equivalent education. The calculus was made using the Relação Anual de Informações Sociais [Annual Report of Social Information] (Rais) microdata. The results were compared with the findings of previous studies based on the Pesquisa Nacional por Amostra de Domicílio [National Household Sample Survey] (PNAD). In 2013, teacher's AR was R$3,576, and that of other professionals was R$5,227, giving the ratio of 0.68. Thus, teachers found themselves in an unfavorable situation. We also observed the comparative advantages of AR calculated by Rais in relation to Pnad in the validity, reliability, population coverage and territorial desegregability aspects.

TEACHERS • SALARY • EDUCATIONAL POLICIES • STATISTICAL DATA

REMUNERAÇÃO MÉDIA COMO INDICADOR DA VALORIZAÇÃO DOCENTE NO MERCADO DE TRABALHO

RESUMO

Este artigo visa a analisar a remuneração média (RM) dos professores das redes públicas de educação básica e a razão entre a RM desses com a dos demais profissionais do mercado de trabalho com a formação equivalente, calculada a partir dos microdados da Relação Anual de Informações Sociais (Rais). Os resultados foram comparados aos achados de estudos anteriores baseados na Pesquisa Nacional por Amostra de Domicílio (Pnad). Em 2013, a RM docente era de R$ 3.576,00 e a razão entre a RM dos professores e a dos demais profissionais no valor de R$ 5.227,00 era 0,68, ou seja, os professores encontravam-se numa situação desfavorável. Observaram-se também as vantagens comparativas da RM calculada pela Rais em relação à Pnad nos quesitos validade, confiabilidade, cobertura populacional e desagregabilidade territorial.

PROFESSORES • SALÁRIO • POLÍTICAS EDUCACIONAIS • DADOS ESTATÍSTICOS

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REMUNERATION MOYENNE COMME INDICATEUR DE LA VALORISATION DES ENSEIGNANTS SUR LE MARCHÉ DU TRAVAIL

RÉSUMÉ

Cet article vise à analyser la rémunération moyenne (RM) des enseignants du reseau public de l´enseignement obligatoire et le rapport entre le RM de ceux-cietcelui des autres professionnels sur le marché du travail ayant une formation équivalente. Ce rapport est calculé à partir des microdonnées du Relação Anual de Informações Sociais [Rapport Annuel d'Informations Sociales] (Rais). Les résultats ont été comparés avec les données d'études antérieures basées sur la Pesquisa Nacional por Amostra de Domicílio [Enquête nationale auprès des ménages] (Pnad). En 2013, le RM d'un professeur était de 3 576 reais et le rapport entre le RM des enseignants et celui des autres professionnels (dont le RM atteignait R$ 5 227) était de 0,68, les enseignants se trouvaient donc dans une situation défavorable. Les avantages comparatifs du RM calculé par le Rais par rapport à celui calculé par le Pnad en ce qui concerne la validité, fiabilité, couverture de la population et désagrégation territoriale ont aussi été observés.

ENSEIGNANT • SALARIE • POLITIQUE DE L'EDUCATION • DONNÉES STATISTIQUES

REMUNERACIÓN MEDIA COMO INDICADOR DE LA VALORIZACIÓN DOCENTE EN EL MERCADO DE TRABAJO

RESUMEN

Este artículo tiene por objeto analizar la remuneración media (RM) de los profesores de las redes públicas de educación básica y la razón entre la RM de éstos con la de los demás profesionales del mercado de trabajo con formación equivalente, calculada a partir de los microdatos de la Relação Anual de Informações Sociais [Relación Anual de Información Sociales] (Rais). Los resultados fueron comparados a los resultados de estudios anteriores basados en la Pesquisa Nacional por Amostra de Domicílio [Encuesta Nacional por Muestra de Domicilio] (Pnad). En 2013, la RM docente era de R$ 3.576 y la razón entre la RM de los profesores y la de los demás profesionales en el valor de R$ 5.227 era 0,68, o sea, los profesores se encontraban en una situación desfavorable. Se observaron también las ventajas comparativas de la RM calculada por la Rais en relación a la Pnad en los ítems validad, confiabilidad, cobertura poblacional y desagregación territorial.

PROFESOR • SALARIO • POLÍTICA DE LA EDUCACIÓN • DATOS ESTADÍSTICOS

Social indicators comprise a broad category of measures of social reality in various areas, such as health, education, work, public security, etc. In education, mainly from the 1990s, Brazil started to count on a large amount of data that allows the generation of numerous indicators with the potential to point out, translate, bring closer, describe or reveal several characteristics and aspects of educational phenomena. This was possible because of several survey implementations and evaluations promoted by Instituto Nacional de Estudos e Pesquisas Educacionais Anísio Teixeira Anísio Teixeira [National Institute of Educational and Research Anísio Teixeira] (Inep) to monitor the Brazilian educational system (ie, Censo Escolar [School Census], Censo da Educação Superior [Higher Education Census], Sistema de Avaliação da Educação Básica [National Basic Education Evaluation System] (Saeb), Exame Nacional do Ensino Médio [National Exam of Upper Secondary Education] (Enem) and Sistema Nacional de Avaliação da Educação Superior [National Higher Education Assessment System] (Sinaes), etc.). In addition there are household surveys about the demographic characteristics of population carried out by Instituto Brasileiro de Geografia e Estatística [Brazilian Institute of Geography and Statistics] (IBGE), mainly Pesquisa Nacional de Amostra por Domicílio [National Household Sample Survey] (PNAD), which is annual, and the decennial Censo Demográfico [Demographic Census].

Although teacher's valorization encompasses a set of fundamental interdependent aspects to ensure adequate working conditions for

teachers,[1] this article specifically addresses the public school primary education teachers' remuneration. The relevance of this type of analysis to educational policies and the research agenda on working conditions and teacher remuneration gains strength. Specially nowadays with the need to adopt indicators to monitor the Plano Nacional de Educação [National Education Plan] (PNE) 2014-2024, Law no. 13,005 / 2014. PNE has "education professionals' valorization" (article 2, item IX) as one of its guidelines, and, specifically the goal 17. This goal forecasts "to value the basic education professionals of public education networks in order to equate teachers´ average income to those other professionals with equivalent education, until the end of the sixth year of PNE", in other words, until 2020 (BRAZIL, 2014).

In PNE's goal 17, the legislator attributes to teachers' "average income" the function of an indicator when it states that the average value of the category should be compared to those other workers to assess teachers' situation in the labor market (BRAZIL, 2014). However, this is not an original strategy of the Brazilian legislator, because the ratio calculated from the division of the "teachers' average remuneration (AR)" by the "average remuneration of other professionals" is an indicator used in international educational statistics for comparison among countries. The Organization for Economic Cooperation and Development (OECD), for example, in the section "How much are teachers paid?, of the Education at a glance annual report (OECD, 2016), shows that the elementary school (ES) "teachers' AR – in OECD countries it is equivalent to 81% of other workers´ average with the same characteristics (high education training, between 25 and 64 years old and full-time employment).[2] This value is 85% and 89%, respectively, for teachers in the final years of primary school and high school.

The central argument of this proposal is that teachers' AR calculated by researchers (among them MORICONI, 2008, ALVES, PINTO, 2011, NERI, 2013, BARBOSA, 2014), civil society organizations (DEPARTAMENTO INTERSINDICAL DE ESTATÍSTICA E ESTUDOS SOCIOECONÔMICOS – DIEESE [INTER-UNION DEPARTMENT OF STATISTICS AND SOCIO-ECONOMIC STUDIES], 2014) and governmental agencies – Inep (BRAZIL, 2015) has been used as an indicator of teachers' level of remuneration of a certain locality or educational network in order to evaluate the remuneration policies in progress. Thus, The AR has assumed a function similar to that of social indicators which, according to Jannuzzi (2005, p. 138), "are measures used to allow the operationalization of an abstract concept or a demand of pragmatic interest" with the purpose of subsidizing the public planning and formulation, implementation and evaluation of policies.

The data source is a determinant aspect to give some desirable methodological attributes to indicators, which are: validity of concept

1
Besides remuneration, focus of this study, it is important to emphasize that teacher´s valorization includes other aspects such as: a) initial and ongoing training for teaching performance; b) admission into the career exclusively by public contest of tests and titles; c) stable employment relationship with guarantee of labor rights; d) career progression based on degree and performance evaluation with criteria established in statute or career plan; e) adequate working hours (including 1/3 for studies, planning and evaluation without interaction with students); f) adequate working conditions in the school (in quantity and quality), in objective aspects such as the number of students per class and the material infrastructure of schools (adequacy of school building spaces, furniture, equipment and educational materials).

2
Teachers' average remuneration (AR) situation in relation to other professionals is compared by dividing the teachers´ AR value by the AR of the other professionals. Thus, a ratio equal to one or more than it means that teachers perceive an AR equal to or higher than other occupations. In other words, values lower than one indicate no equation and a condition of devaluation (or unfavorable situation) of teachers in this aspect.

representation; measurement reliability; population coverage; operational feasibility; update periodicity; and disaggregation of population and territory (JANNUZZI, 2005). This is relevant because, to a great extent, they reveal the "quality" of the indicator for the proposed purposes. At this point, Pnad / IBGE is one of the most used sources for calculating teachers' AR in Brazil. Perhaps, therefore, this is the source indicated by the legislator for the monitoring of PNE's goal 17 (BRAZIL, 2014). However, it is important to emphasize that this IBGE´s survey was not designed to capture the specific occupation characteristics, therefore, caution has to be exercised in interpreting the teachers' AR results, especially when the results are decoupled by federal units. Due to this fact and because of the searching for new possibilities of data sources, in this article, teachers' AR was calculated from the Relação Anual de Informações Sociais [Annual Social Information Report] (Rais) microdata. Rais microdata began to be released in June 2012 by the Coordenação Geral de Estatísticas do Trabalho do Ministério do Trabalho e Previdência Social [General Coordination of Labor Statistics of the Ministry of Labor and Social Security] (CGET / MTPS) (see note in BRAZIL, 2012).

In this context, this article proposes an analysis of basic education teachers´ AR of public schools, and the ratio between the teachers´ AR and that of other professionals in the labor market with equivalent training as indicators of the teacher´ valorization in the labor market, from Rais microdata. In addition, it aims to discuss possible comparative advantages of this source in relation to Pnad. For this analysis were used the microdata of 2013.

The article is structured in four sections. The first one presents a brief review of literature about teachers' remuneration in Brazil. Next, the presentation of methodological aspects for AR calculation from Rais. The third section presents the results and discussion of AR attributes, calculated from Rais. The last section aimed the final considerations.

LITERATURE REVIEW

Education practitioners´ valorization is one of the envisaged principles of national education in the Constituição Federal [Federal Constitution] of 1988 (CF, article 206, item V) (BRAZIL, 1988) and Law no. 9,394 of December 20, 1996. CF establishes the Lei de Diretrizes e Bases da Educação Nacional [Law of Directives and Bases of National Education] (LDB) (article 3, item VII) (BRAZIL, 1996). It is a theme with a long journey of struggles in the country's educational history (MONLEVADE, 2000; VICENTINI; LUGLI, 2009) that still remains in the educational category agenda. In any case, the inclusion of provisions in the maintenance fund[3] laws that aimed at teachers´ adequate remuneration, the Piso Salarial Profissional Nacional [National Minimum Wage Plan] (PSPN) definition (Law 11,738 / 2008) (BRAZIL, 2008) and 2014-2024 Goals of Plano Nacional

3 We refer to the Fundo de Manutenção e Desenvolvimento do Ensino Fundamental e de Valorização do Magistério [Fund for Development and Maintenance of Basic Education and Teaching Values] (FUNDEF), created by Law n. 9,424 (BRAZIL, 1996), which ran from 1998 to 2006 and was replaced by Fundo de Manutenção e Desenvolvimento da Educação Básica e de Valorização dos Profissionais da Educação [Funding for Maintenance and Development of Basic Education and Valorization of Education Professionals] (FUNDEB), regulated by Law n. 11,494 (BRAZIL, 2007c), which is scheduled to run from 2007 to 2020.

de Educação [National Plan for Education] (PNE) (BRASIL, 2015) related to teachers training in the undergraduate and postgraduate courses, in the area they work on (goals 15 and 16), remuneration (goal 17), and career plan (goal 18). All of them are advances in the formal recognition that teachers' working conditions are still inadequate and that teachers' valorization is one of the central elements for guaranteeing the right to education in conditions of quality for all children, young people and adults.

Although the comparison of the AR of a given occupation, with those of the others, is a commonly adopted strategy in the analysis of the remuneration level of different professions, it is fundamental to consider that a decent remuneration is the Brazilian worker's right. That is, it is not an issue to be established by the labor market and evaluated only by means of indicators that somehow rank occupations according to the prestige of each one converted into wage recognition (although, in capitalist societies, it must not neglect movements so that remuneration is considered only as a labor market price issue). The Federal Constitution of 1988 (BRAZIL, 1988) in the chapter of social rights, article 7, section IV, establishes that Brazilian workers are entitled to

> [...] nationally unified minimum monthly wage, established by law, capable of satisfying one basic living needs and those of their families with housing, food, education, health, leisure, clothing, hygiene, transportation, and social security, with periodical adjustments to maintain his/her purchasing power, it being forbidden to use it as an index for any purpose.

In Brazil, the ratio of teacher´s AR to that of other professionals has been reported in academic, government and civil society publications with different results (Table 1). These divergences regard to value of the same indicator suggest a reflection on the methodological choices, since the elaboration of indicators is not a neutral process and always occurs from the authors´ theoretical and political choices (JANNUZZI, 2005).

In the scope of research in educational policies, teacher´s remuneration is an issue addressed in different thematic axes. One of them is composed of the studies related to the historical trajectory of the professionalization of the category and the patterns of union demands in Brazil (MONLEVADE, 2000, GOUVEIA, FERRAZ, 2013, GATTI, BARRETTO, 2009 and VIEIRA, 2014), (MORDUCHOWICZ, 2003; OLIVEIRA, 2004, 2007). The thematic axis also goes throughout educational reforms in Latin America, especially since the 1990s (MORDUCHOWICZ, 2003; OLIVEIRA, 2004, 2007), and to education financing, which, in general, discuss the proportion of staff expenditure in the education budget,

evaluate the remuneration within context of maintenance funds (FUNDEF and FUNDEB) and estimate the appropriate level of financial investment to ensure remuneration as one of the necessary elements for the provision of quality education (VERHINE, 2006; CARREIRA; PINTO, 2007; CAMARGO et al., 2009; ALVES, 2012; CARA; ARAÚJO, 2011; BARBOSA, 2014; PINTO, 2014; CARVALHO, 2015). In another research line, there are studies that analyze the remuneration as a central element for teacher´s social valorization for profession attractiveness. In this axis, Gatti *et al.* (2010) and Louzano *et al.* (2010) found that the low payment historical trajectory in Brazil created an image of a profession with low social status and, thus, unattractive for high school youngsters (especially for those whose more favored socioeconomic-educational trajectories allow to choose a higher degree of possibilities in university entrance exams).

THE AVERAGE REMUNERATION AS AN INDICATOR: CRITERIA AND RESULTS OF SOME PREVIOUS STUDIES

Among the studies that has calculated Brazilian teachers' AR, two groups were identified. In the first group, there are those who compared teachers' AR and other occupations. They has verified teachers' position among different occupations in a ranking (SAMPAIO *et al.*, 2002; ALVES; PINTO, 2011; NERI, 2013; BARBOSA, 2014). These studies have concluded that teachers with higher education training have a comparatively lower remuneration than those of other occupations with equivalent training. In the ranking of remuneration elaborated by Neri (2013), doctors' AR is 3.5 times greater than teachers´. Lower remuneration of teachers with higher education training can be seen, moreover, according to Alves and Pinto (2011), in relation to some occupations that only require training at a technical level.

Another set of studies compared teachers' AR and that of other occupations by calculating the ratio between teachers' and non-teachers' remuneration. They are: Moriconi (2008), Brito and Waltenberg (2014), Dieese (2014), Todos pela Educação [All for Education] (2014), Nascimento, Silva e Silva (2014), Inep (BRAZIL, 2015) and Jacomini, Alves and Camargo (2016). In general, these studies showed that the remuneration of teachers with higher education training is lower than that of other professionals.[4] However, as observed by Moriconi (2008), Brito and Waltenberg (2014) and Jacomini, Alves and Camargo (2016), teachers with high school education training has a favorable position in relation to other occupations. These studies are, to some extent, in the direction suggested by PNE´s goal 17 monitoring. Therefore, it is with this group that this article intends to dialogue in a more direct way, based on Chart 1.

4 It is worth to mention that, according to Censo da Educação Básica 2015 [Basic Education Census 2015] (BRAZIL, 2017a), basic education teachers with higher education training represent 76.4% of the 2.18 million teachers in classroom.

A comparative analysis of the six studies presented in Chart 1 allows us to conclude that the authors did not use the same criteria for calculating AR related to: a) teacher profile - public / private sector, education teaching network (federal, state and municipal), education level (higher secondary, higher education or graduation), employment relationship type, working day, teaching level and age group; b) criterion of analysis and treatment of outliers values; and c) strategy of standardizing the remuneration from the working day. Thus, although they have used the same data source (Pnad) and the indicator calculation technique (mean*), the results are different*. This triggers an alert that, although with the same name (average remuneration), they are not identical indicators and therefore, rigorously, the *results are not comparable*.

Nevertheless, it can be stated that there is no expressive variation between the ARs and there is some convergence of the results calculated by different criteria, since the mean of AR in six studies, current updated values for 2013, is R$ 2,515.00, with a standard deviation of R$ 405.00 and a coefficient of variation of 16% (considered low). In other words, if the central question answering is the interest of 2017-2024 PNE´s goal 17 (analyzing the wage equation between teachers and other professionals with the same training), the studies present the same conclusion: there is a considerable distance between teachers´ wages with higher education training and other professionals with the same level of training. This includes including the distance measured by the ratio between the teachers´ AR and that of other professionals (BRAZIL, 2015). Giving a magnitude notion, studies that analyzed professionals with higher education training and used a standardized working day for 40 hours per week (MORICONI, 2008; DIEESE, 2014; ALL BY EDUCATION, 2015; JACOMINI; ALVES; CARMARGO, 2016) converge to a ratio of about 0.6 (this means, teachers earn around 40% less).

CHART 1

SYNOPSIS OF STUDIES CARRIED OUT ON THE TEACHERS' AND OTHER PROFESSIONALS' NATIONAL AVERAGE REMUNERATION, BRAZIL, UPDATED VALUES FOR 2013[1]

AUTHOR/DATE	DATA SOURCE/ YEAR	TEACHER PROFILE	AR (NOMINAL VALUES IN R$)	AR (UPDATE VALUES TO 2013 IN R$)	OTHER PROFESSIONALS´ PROFILE	RATIO TEACHERS/ OTHER OCCUPATIONS
Moriconi (2008)	Pnad 2006	Public education network, higher education, 40h, from 18 to 65 years old	2,242	3,301	Public employees (higher education), 40h	0.48
					Private sector employees (higher education), 40h	0.64
					Private sector teachers (higher education), 40h	0.81
Brito e Waltenberg (2014)	Pnad 2009	Public and private education network, high school teachers, higher education, 40h, from 25 to 55 years old, with formal employment relationship (Consolidação das Leis do Trabalho - CLT e estatutário) [Consolidation of Labor Laws – and statutory]	2,194	2,755	Public employees (all training levels), 40h	1.10
					Private sector employees (all training levels), 40h	1.32
					Science and the arts employees (higher education), 40h	0.87
Dieese (2014)	Pnad 2013	Public education network, higher education, 40h	2,580	2,580	Other professionals, public and private sector (higher education), 40h	0.60
Todos pela Educação (2015)	Pnad 2013	Public and private education network, higher education, 40h	2,016	2,016	Professionals from other areas (higher education), 40h	0.57
Inep (BRASIL, 2015)	Pnad 2013	Public education network (states and municipalities), from 12 to 17 years study, 40h	2,465	2,465	Other professionals, public and private sector, (from 12 to 17 years study), 40h	0.76
Jacomini, Alves e Camargo (2016)	Pnad 2013	Public education network, higher education, 40h	2,613	2,613	Other professionals, public and private sector, (higher education), 40h	0.61

Source: Authors' elaboration based on the cited studies.

Note:

1 - Pnad data is collected each year in September. Therefore, the values were updated from the month / year of each study to September / 2013, based on the INPC / IBGE.

Among these studies, results that diverge from what has been presented in the literature on the subject are worth noting. Brito and Waltenberg (2014) focused on "high school teachers in the public and private sector" and concluded that they earn more than other civil servants and private sector employees. These findings seem surprising, but it is important to note that the authors compared teachers and other professionals with different training levels. In the comparison groups (other civil servants and private sector employees), there are professionals with different training levels (including elementary and high school), while teachers´ sample is composed only of those with higher education training. In the same study, when comparing teachers´ AR with that of other professionals in the sciences and arts (a group in which, according to the authors, the comparison is more pertinent), it was found that teachers received almost 13% less. It is also worth noting that the authors used a sample composed only of professionals between 25 and 55 years old and with formal employment relationships (Consolidação das Leis do Trabalho [Consolidation of Labor Laws] – CLT– and statutory).

Moriconi (2008) also used additional criteria for selecting the sample. The author selected only teachers and non-teaching staff between the ages of 18 and 65 and excluded self-employed workers, domestic employees and employers from the comparison group (non-teaching staff).

Studies by civil society organizations, Dieese (2014) and Todos pela Educação (2015) do not present methodological details for AR calculation. The values of the ratio of AR calculated by the two studies is similar but there is a significant difference between teachers´ AR (more than R$ 500.00 or 28%). This can be explained because Todos pela Educação (2015) considered public and private network teachers to compose the average.

Inep's (BRAZIL, 2015) and Jacomini, Alves and Camargo's (2016) studies were elaborated aiming to discuss PNE´s goal 17 monitoring. They present a good detailed level of procedures and calculations. Therefore, to allow the comparison of the results, these article methodological choices, presented in the next section, were based on these two studies.

The studies that analyzed the teachers' remuneration from Rais data are recent. An explanatory hypothesis is that only in June 2012 CGET / MTPS made available open access to microdata in this source on the Internet (BRASIL, 2012).[5] With access only to aggregated information (synopses and metadata), Rais significantly diverged from Pnad in potential use for research on specific occupational remuneration.

Nevertheless, three studies were identified. Fernandes, Gouveia and Benini (2012) used Rais data from 1998 to 2008. The authors did not have access to microdata. The research focused on the high school

5
Rais was established in 1975 and until May 2012 there was not a clear policy regarding a widespread microdata dissemination. Microdata access was only possible by signing an endorsement justifying its use. When a user was authorized to access them, he/she received a CD from Post Office. This form of accessibility limited the potential dissemination of source for researching. In contrast to Pnad, which was established in 1967 and are carried out annually since 1971 (except in Demographic Census years), for decades has allowed broad access to researchers. Pnad has become a traditional source for socioeconomic researches in a variety of fields (economics, education, demography, sociology, etc.). Currently, Rais microdata, with no workers´ and employers´ identification, from 1985 to 2016, are available at <ftp://ftp.mtps.gov.br/pdet/microdados/RAIS/>.

teachers' remuneration of public schools in Brazilian state capitals. The authors concluded that there was a general loss in the purchasing power of teachers' remunerations in relation to the national minimum wage. During Fundef´s validity period (1998 and 2006) they also confirmed the hypothesis of a negative relationship between the prioritization of elementary education and teachers' remuneration. Regarding the use of Rais, when comparing the mean of the AR calculated in previous studies that used Pnad 2006, they concluded that there was convergence between the obtained results by the two sources. However, the absence of remuneration values in some localities, during some years of the analyzed period, led the authors to cast doubt on the accuracy level of provided information by public sector employers, both in the sense that they are correct and not complete. In any case, the study reveals Rais as a potential source for teacher's remuneration analysis and suggests new studies.

Nascimento, Silva and Silva (2014, p. 46) also used Rais to compare the public school teachers' remuneration level with higher education training and other "typical higher level training careers". The authors used microdata of 2012. They did not present the methodological detail nor the AR value, but concluded that teachers received only 80% of the remuneration of other occupations (ratio = 0.80).

Inep (BRAZIL, 2017) carried out another recent study that aimed at using Rais as a source for analyzing basic education teachers´ remuneration. The institute paired the identified microdata with Cadastro de Pessoas Físicas [Brazil´s version of a Social Security Number] (CPF) of teachers registered on Censo da Educação Básica and Rais database in 2014. This pairing concluded that 93.2% of 2,229,256 teachers, included in Inep´s survey, were listed in Rais. This result clarifies some doubts regarding the "coverage" of Brazilian teachers' data in Rais – also pointed out by Fernandes, Gouveia and Benini (2012). However, the part not found (6.8%), although a small percentage, refers to a large contingent of professionals, resulting in more than 140 thousand teachers with no information in Rais. In other words, although achieving an undeniable potential for significant coverage ratio in 2014, the study reveals that there are still networks that continue failing to provide complete information to Rais. From this work, Inep started to disseminate "Teachers' Average Remuneration" as one of the educational indicators available on the institute's website. The results showed that, at the national level, federal public school teachers' AR, for 40 hours per week, in 2014, was R$ 7,767.00, while in the state networks it was R$ 3,476 and it was R$ 3,166.00 in the municipal networks. The study did not aim to calculate the ratio between other professionals' and teachers' AR.

EVALUATION OF SOCIAL INDICATORS

The Brazilian experience using social indicators is relatively recent, largely beginning in the 1990s. There was an environment of growing demand for social rights established by the recently enacted Constitution. In that decade, it appears the first experiences that demonstrate the potential of synthetic measures as tools to describe and monitor aspects of quality of life and/or social vulnerability over time and to plan corrective actions at national and local levels (NAHAS, 2002; JANNUZZI, 2002; GUIMARÃES, JANNUZZI, 2004). The country's experience was also based on international experience that published the Índice de Desenvolvimento Humano [Human Development Index] (IDH) in 1990.[6]

The repercussion of the dissemination of indicators has highlighted the need to list requirements for production of effective measures for the description of empirical situations or, in other words, to identify the desirable characteristics of a "good" (relevant, credible, accurate) social indicator (JANNUZZI, 2002). The need to evaluate the quality of indicators is mainly because the indicators have subsidized public policies in different areas and, at some level, to "translate" into numbers how good or bad the situation is in a certain context (territory). Hence, the potential and the required cares in the elaboration of synthetic social measures, since different methodological choices lead to different results (as pointed out in the discussion on Table 1). In addition, indicators have been used as tools of comparison and evaluation with the potential to induce actions (and "not actions") of decision makers (JANNUZZI, 2002).

For an evaluation of the indicators, a matrix with 12 desirable properties (characteristics) proposed by Jannuzzi (2005) is presented as a useful method to qualify the use of the indicators. This author´s proposal of the "desirable properties of matrix for an indicator" is innovative in order to facilitate the comparison between different indicators from a list of requirements for the production of effective indicators. However, it may be noted that the author's definition of desirable properties is the result of a compilation of epistemological criteria. This is used for the production of scientific knowledge (in the case of attributes of validity and reliability) and requirements from other studies, such as Araújo, Conde and Luzio (2004), Costa and Castanhar (2003), Kassai (2002), Jannuzzi (2002) and Guimarães and Jannuzzi (2004). Thus, Jannuzzi (2005) proposes the following properties: 1) validity of concept representation; 2) measurement reliability; 3) operational feasibility; 4) population coverage; 5) territorial and population disaggregation; 6) update periodicity; 7) comparability of the historical series; 8) relevance to the political agenda; 9) methodological transparency, 10) communicability; 11) specificity; and 12) sensitivity. Of these attributes,

6
IDH was created by the Pakistani economist Mahbub ul Haq (human development theory pioneer) in collaboration with the Indian economist Amartya Sem (recognized for his ideas on development, social welfare, inequality and poverty and winner of the Nobel Prize in Economics of 1998). The indicator was published by the United Nations Development Program (UNDP) for the first time in 1990, and since then it has been published annually. It has been considered, and even nowadays, in many analyses, as an important measure to compare and rank countries´ level of development. In Brazil, in 1998, based on the 1970, 1980 and 1991 Censuses, the Índice de Desenvolvimento Humano Municipal (IDH-M) was published. The measure was published again based on 2000 and 2010 Censuses, aiming at the identification of different local realities, in addition to directing actions and resources to mitigate difficulties and inequalities previously unexplained or with magnitudes not yet measured.

the first seven have a determining aspect in the data source. Therefore, in this article, only seven will be used to evaluate the teachers´ AR quality calculated from Rais and Pnad data.

Based on the author, it is worth recalling that the *validity* of *concept representation* refers, in general terms, to the degree to which the indicator expresses what it intends to inform (JANNUZZI, 2005). An indicator will be valid if it expresses, more trustworthy, the reality of the phenomenon / object in a given context. In addition, *measure reliability*, in turn, refers to the measurement of the intended aspect in a correct, coherent and equally constant way. According to Martins and Theóphilo (2009), this attribute is related to the confidence that one has in the measure itself - which, in turn, depends on the data source used, the way of collecting the information – and the method of calculation. *Operational feasibility*, on the other hand, refers to the degree of facility to obtain needed data to calculate the indicator. Measures that depend on complex or costly data collection are low in feasibility. Elseways, indicators generated from administrative data are highly feasible, since they are collected by the daily activities of public administration, and, therefore, they available and have no cost to be collected. An indicator with a good level of *territorial and population coverage and disaggregation* can provide representative information of the empirical reality, in various aspects of social groups, according to their specific constitutive characteristics (age group, sex, color / race, income, schooling, occupation, etc.) and territorial context (country, region, state, municipality, urban / rural area, etc.). Two properties related to the temporal perspective of analyzes are periodicity and comparability. While the *update periodicity* suggests that the indicators are calculated on a regular basis compatible with the need to monitor information in order to capture changes in empirical reality, *comparability* proposes that the indicator should measure its object in a stable (reliable) way throughout the time to allow a historical serial analysis.

METHODOLOGICAL ASPECTS

Based on Rais microdata of PNE 2014-2024 goal 17, this study possible contribution is to present the primary school teachers' AR value and the ratio between teachers' and other professionals´ AR, considering equivalent training in the labor market.

RAIS AS A DATA SOURCE FOR THE ANALYSIS OF TEACHERS´ REMUNERATION

Rais was established by Decree n. 76,900, December 23, 1975 (BRAZIL, 1975). Its objectives are: "supplying the needs of controlling of the labor activity in the Country; the data provision for the preparation of labor statistics; the availability of labor market information to

government entities" (BRAZIL, 1975).[7] For this, the country´s public and private sector employers must annually declare their employees data by electronic mean, which is provided by labor ministry.[8]

Regarding the analysis unit, employee information is provided for each employment relationship. On this point, it is worth to mention that a worker can be registered on Rais more than once, depending on the amount of formal employment relationships one has in the collection year.

This article used data from 2013. In that year, information was collected on 2.72 million teachers' employment relationships from public basic education networks. Considering that, according to 2013 Censo Escolar (BRAZIL, 2017a), there were 1.72 million teachers in public networks and that a teacher could have more than one employment relationship, there seems to be a good information coverage of this category on Rais.[9]

The variable "nominal average remuneration value" [VlRemunMédiaNom], included in the Rais microdata, was used to describe workers' remuneration. In this variable, the various types of remuneration that make up the worker's salary are contained (wages, salaries, benefits, allowances, time of service, vacation compensation, supplements, bonuses, gratuities, commissions, etc.). See full list in Ministério do Trabalho (MTb) (BRAZIL, 2016, page 36). These remunerations cover what makes up the typical remuneration of a public school teacher. The 13th salary does not make up this variable. Therefore, when calculating the nominal average remuneration, only the inclusion of "vacation time" (referring to a third of the base salary) seems to distort to a greater workers´ typical monthly remuneration, around 2.78%.[10]

The following variables were also used as auxiliary variables for AR calculating (classification and selection of cases and standardization of values): occupation type (described by Classificação Brasileira de Ocupações [Brazilian Classification of Occupations] (CBO) edition 2002) (BRAZIL, 2016), administrative dependence, working hours, education level, type of employment relationship (Chart 2). In addition to the variables listed in Chart 2, the microdata survey still contain a total of 45 variables, including workers' characteristics and work establishment attributes.

7
The first data collection of Rais occurred in 1975. It is now possible to access the microdata of data collections from 1985 to 2016 on the Ministério do Trabalho's website, available at: <ftp://ftp.mtps.gov.br/pdet/microdados/RAIS />. Access on: Jan. 26 2018.

8
According to art. 2 of the Ordonnance n. 1,464, dated December 30, 2016, the ones required to provide information to RAIS are: "I - urban and rural employers, as defined in art. 2 of the Consolidation of Labor Laws - CLT and in art. 3 of Law No. 5,889, on 8 June, 1973, respectively; II - subsidiaries, agencies, branches, representations or any other form of entities related to the foreign-based legal entity; III - freelancers or professionals who have maintained employees in the base year; IV - organs and entities of the direct administration, autarchic and functional of the federal, state, Federal District and municipal governments; V - professional councils, created by law, with powers to supervise professional practice, and parastatal entities; VI - condominiums and civil societies; and VII - extrajudicial registries and consortia of companies" (BRAZIL, 2017b).

9
At this point, as previously mentioned, Inep (BRAZIL, 2017a) verified, through base matching, that 93.2% of teachers counted in Censo Escolar were in Rais in 2014.

10
In a hypothetical situation, a teacher receives a monthly remuneration of R$ 3,000.00 and worked 12 months in a year. With the inclusion of the value of 1/3 vacation, the value of the variable "nominal average remuneration value" [VlRemunMédiaNom], broadly speaking, is R$ 3,083.33 [((3,000 x 12) + (3,000 x 1 / 3)) / 12]. That is, 2.78% above the R$ 3,000 which is, in fact, the teacher's monthly remuneration, in this example.

CHART 2
VARIABLES TRANSFORMED BY GROUPING VALUES OF THE ORIGINAL RAIS 2013 VARIABLES

TRANSFORMED VARIABLE[1]	CATEGORIES OF ANALYSIS[2]
Elementary education teacher [CBOOcupação2002]	1 -Yes[3]
	0 - No [Other occupations]
Type of employment relationship [TipoVínculo]	1 - Employee (CLT) [10, 15, 20, 25, 60, 65, 70, 75]
	2 - Statutory (RJU) [30, 31]
	3 - Non-permanent civil servant [35]
	4 - Temporary staff [50, 90, 95, 96, 97]
	5 - Apprentice worker [55]
	6 - Without employment relationship [80]
	7 - Other contracts [40]
Administrative dependency [NaturezaJurídica]	1 - Federal [1015, 1040, 1074, 1104, 1139, 1163]
	2 - State [1023, 1058, 1082, 1112, 1147, 1171]
	3 - Municipal [1031, 1066, 1120, 1155, 1180]
	4 - Public [1201, 1210, 2011]
	5 – Private[4]
Education level [Escolaridadeapós2005]	1 - Not complete or not studied elementary school [1, 2, 3, 4]
	2 - Elementary school [5,6]
	3 - Complete high school [7,8]
	4 - Complete high education [9]
	5 - Master's degree [10]
	6 - Doctorate degree [11]
Standardized average remuneration for a 40-hour working week [VlRemunMédiaNom]	Value calculated by = (nominal average remuneration value / amount of contracted hours) x 40

Source: Authors´ elaboration from the analysis of the dictionaries of variables of Rais 2013 and its annexes.

Notes:

1 - The name of the original variable is enclosed within square brackets.

2 -The original variables values which were grouped to generate the transformed variables are enclosed within square brackets.

3 - 231105, 231110, 231205, 231210, 231305, 231310, 231315, 231320, 231325, 231330, 231335, 231340, 232105, 232110, 232115, 232120, 232125, 232130, 232135, 232140, 232145, 232150, 232155, 232160, 232165, 232170, 331105, 331205, 331305, 332105, 332205, 233110, 233115, 233120, 233125, 233130, 233135, 239205, 239210, 239215, 239220, 239225, 239420

4- 1198, 2038, 2046, 2054, 2062, 2070, 2076, 2089, 2097, 2100, 2119, 2127, 2135, 2143, 2151, 2160, 2178, 2194, 2208, 2216, 2224, 2232, 2240, 2259, 2267, 2275, 2283, 2291, 3034, 3042, 3050, 3069, 3077, 3085, 3093, 3107, 3115, 3123, 3130, 3131, 3204, 3212, 3220, 3239, 3247, 3999, 4014, 4022, 4080, 4081, 4090, 4111, 5002, 5010, 5029, 5037

As a partial summary, Chart 3 presents a brief comparison of the main Rais characteristics discussed in this section, in perspective with the characteristics of Pnad (commented on in the study synthesis presented in Chart 1), in order to allow a panoramic view of some fundamental differences between the sources, when used to analyze teacher's remuneration.

CHART 3
COMPARATIVE SYNOPSIS OF THE GENERAL CHARACTERISTICS OF RAIS AND PNAD

ASPECT	RAIS	PNAD
Type of survey	Census	Sample
Periodicity	Annual	Annual1
Analysis unit	Employment relationships	Teacher
Respondent	Employers (staff / accounting department)	Teacher, other resident or non-resident household
Level of disaggregation of results	Brazil, regions, federation unity (UF) and municipalities	Brazil, regions, (UF) and nine metropolitan regions
Teachers´ identification	CBO Codes of Employer´s free choice	CBO codes identified by IBGE´s researcher
Sample size / public school teachers' population in 2013	2,717,122	4,280
Method of collecting data on monthly remuneration	Specific electronic form to collect wage data	Respondent self-declaration to a questionnaire question

Source: Authors' elaboration from Rais and Pnad 2013 microdata, IBGE (2013); MTb (BRAZIL, 2016).

Notes: (1) a new methodology, Pnad keep on. It started being adopted by IBGE from 2015. This new methodology expect to collect data quarterly. According to the characteristics presented in this table, Pnad 2015 (IBGE, 2015) was the last year of the research spreading.

CALCULATION FORMULAS

The challenging for teachers´ AR calculation is not in the complexity of the statistical technique employed (since the average is used), but in the definition of the teacher´s profile to which the AR refers, the data treatment (atypical values, for example) and AR standardization values. The divergences between the results in the publications, as shown in Chart 1, are derived from these methodological choices. In general, the studies define teacher´s profiles by the following variables: educational network (federal, state, municipal or private), level of education, workday duration, type of employment relationship and employment period.[11] The "ideal" in these choices is to obtain subjects´ profile with representative characteristics of the teachers´ board of educational network or locality under analysis to calculate the AR from this identification.

Several choices are possible depending on the purpose of the analysis. In this article, the interest is to calculate the AR to meet the monitoring goal 17 of PNE's 2017-2024 (ref?). The methodological definitions aimed to dialogue with Inep (BRAZIL, 2015) and Jacomini, Alves and Camargo (2016), who have a similar purpose, despite using Pnad, a source indicated by legislator.

Thus, based on the text of goal 17, the AR in this study was calculated for groups of workers with the following profiles:

a. basic education teachers - public networks (federal, state and municipal), with higher education training (including graduate program);

11 The data absence on employment period has done with that some studies, such as Moriconi (2008) and Brito and Waltenberg (2014), use the age group as a *proxy* variable. Data absence is a variable that has an effect on teacher´s remuneration of networks that pay additional payment for employment period (quinquennial) and / or which has a career plan with progression criteria based on employment period.

b. other professionals: public and private sector, with higher education training (including graduate program).

No restriction or option was adopted regarding the related characteristics: type of employment relationship, as Brito and Waltenberg (2014) did; workers' employment period, as Moriconi (2008), Brito and Waltenberg (2014) did; and the types of occupation that compose other professionals' group, as Moriconi (2008) did. It should be considered that the text of goal 17 deals with a very broad teachers' profile.

Another methodological decision that deserves to be mentioning is the delimitation of the category "teachers of public basic education networks". Although Inep's study (BRASIL, 2017) also considered higher education teachers (because of federal institutes) and other educational functions (pedagogue, pedagogical coordinator, etc.) for this group´s composition, it was only considered the occupations that contained the term *teacher*, which was related to the stages / modalities of basic education.

For comparing the two-groups' remuneration, AR was calculated for a standardized forty-hour workweek, according to the formula presented in Figure 1.

FIGURE 1
FORMULA OF TEACHERS' AND OTHER WORKERS'AR FOR A STANDARDIZED JOURNEY TO FORTY-HOUR WORKWEEK

$$\mathbf{AR}_{t;\,f} = \frac{\sum \left[\frac{Ri}{ji} \times 40\right]^{\,[j \geq 20 \; ou \; J \leq 44;\; \text{if t=1;then } d=1 \; to \; 4;\; \text{if t=0;then } d=1 \; to \; 5\,]}}{N}$$

Where:
* AR = worker´s average remuneration
* t = occupation type: teachers = 1; other occupations = 0 (generated by CBOOcupação2002 – see Table 2)
* f = worker´s education level: Complete high school = 3; Complete higher education = 4, 5 e 6 (generated by Escolaridadeapós2005– see Table 2)
* R = employment´s nominal average remuneration value (original variable = VlRemunMédiaNom)
* i = individual employment relationship (It varies from 1 to n)
* j = amount of contracted hours per week (original variable = QtdHoraContr)
* d = administrative dependency: public = 1, 2, 3 e 4; private = 5 (generated by NaturezaJurídica – see Table 2)
* N = number employment relationships

Source: Authors' elaboration.

Some considerations about the adopted criteria in formula are relevant. In relation to education training, it is known that teachers' career path is also structured based on training level. Therefore, the formula suggests that RA should be calculated separately high school and higher education workers. Conceprning working day, in order to avoid distortions in AR standardization for 40-hour working week (underestimation due to long work weeking hours (greater than 44 hours) or overestimation due to short working week hours (less than 20 hours), the formula restricts the calculation to employment relationships with contracts from 20 to 44 hours per week. Rais 2013 data show that, for the compared groups in this study, only 9.6% of teachers have employment relationships with workdays of less than 20 hours per

week. This number is 4.7% among other professionals. The indicator obtained by the ratio between the teachers' and other professionals' AR is the measure used to verify the equivalence of the average income between teachers and other professionals. The calculation formula is in Figure 2.

FIGURE 2
CALCULATING FORMULA FOR THE RATIO BETWEEN THE TEACHERS´ AND OTHER PROFESSIONALS´ AVERAGE REMUNERATION

$$\mathbf{Ratio_f} = \frac{AR^{[t=1]}}{AR^{[t=0]}}$$

Where:
* AR = worker´s average remuneration
* f = worker´s education level: Complete high school = 3; Complete higher education = 4, 5 e 6 (generated by Escolaridadeapós2005– see Table 2)
* t = occupation type: teachers = 1; other occupations = 0 (generated by CBOOcupação2002 – see Table 2)

Source: Authors' elaboration.

Regarding the identification and treatment of atypical values (outliers), the criterion used in this article had as reference procedure IBGE applied for analyzing the income variable in Censo demográfico 2010 (IBGE, 2012).That census classified values in six interquartile ranges above the upper quartile as atypical and removed them from the analysis. This criterion was also adopted by Inep (BRAZIL, 2015) and Jacomini, Alves and Camargo (2016). Additionally, it was also considered atypical the values below one current minimum wage in 2013 (R$ 678.00), for a 40-hour work, which, according to the Federal Constitution of 1988 (article 7), is the lowest monthly amount that a worker can receive (BRASIL, 1988).

RESULTS AND DISCUSSION SECTION

In 2013, Rais collected data on 75.4 million employment relationships of the Brazil´s public and private sector employers. From this total, 2.72 million workers (or 3.6%) were identified with a teaching employment relationship in the public and private education network (see classification criteria in Chart 2). Considering that, according to Censo Escolar 2013 (BRAZIL, 2017a), there were 1.72 million teachers in public networks and that a teacher could have more than one employment relationship, there seems to be good information coverage of this category in Rais. [12]

Table 1 presents the teacher's population profile based on the employment relationships reported in Rais. The purpose is verifying if the employment relationships informed by public networks contain information bias (or omission of it) to the point of composing a population with a very different profile from the one known by other sources. For this, the general characteristics traced by Rais were compared to those

12 At that point, as mentioned earlier, Inep (BRAZIL, 2017) verified, through base matching, that 93.2% of the teachers counted in the Censo Escolar were in Rais in 2014.

presented by the educational surveys carried out by Inep (preferably Censo Escolar and alternatively, Prova Brasil [Brazil Exam]) and by Pnad / IBGE.

Initially, it should be pointed out that Rais' unit of analysis is the employment relationship, while the other sources are the individual. This explains the fact that Rais has almost one million more employment relationships than the number of the country's teachers counted in Censo Escolar. This means that in 2013, on public networks alone, several teachers had more than one employment relationship. Through the identified microdata provided by the Ministério do Trabalho,[13] it was verified that: about 1.72 million (78.9%) have only one employment relationship; 416.4 thousand have two relationships (19%); and 46.3 thousand (2.1%) had three or more employment relationship in public networks. In some education networks, having more than one relationship is common. In the Curitiba's municipal network, for example, the teachers' standard working day is 20 hours per week. Teachers wishing to work 40 hours may apply for another employment relationship and may have two functional enrollments.

Going back to number analysis in Table 1, the described profile by Rais in the national aggregation is quite close to that of Pnad and Censo Escolar in terms of level of education, administrative dependency and employment relationship. On the other hand, there is considerable disagreement between Pnad and Prova Brasil regarding the period of employment (mainly regarding the proportion of teachers starting their careers). The journey profile also has similarities to that described by Pnad. In summary, after an attempt of external validation, it can be concluded that the Rais 2013 data seem to be representative in the national aggregation, since this source data refer to a teachers profile known by at least one external source.

13 The microdata that identify workers (by CPF, employment and social insurance book number and Programa de Integração Social [Social Integration Program] (PIS)) are provided by Ministério do Trabalho for research purposes by signing a term of confidentiality. These were obtained in the context of Pesquisa Observatório da Remuneração Docente [Teacher Remuneration Observatory Research], carried out from 2013 to 2016 in 12 states (Rio Grande do Norte, Paraíba, Piauí, Pará, Roraima, Mato Grosso, Mato Grosso do Sul, Minas Gerais, Santa Catarina and Rio Grande do Sul). More information is available at: <http://observatorioderemuneracaodocente.fe.usp.br>.

TABLE 1
WORK AND TEACHER CHARACTERISTICS OF PUBLIC PRIMARY EDUCATION NETWORKS BY DIFFERENT SOURCES, BRAZIL, 2013

Characteristics	Rais		Pnad			Other sources	
	N*	%	sample	N**	%	N***	%
Education level						Censo Escolar	
Elementary school	46,821	1.7	52	23,397	1.0	3,845	0.2
High school	557,010	20.5	993	560,315	23.2	285,194	16.6
High education	2,055,478	75.6	3,235	1,827,635	75.8	875,289	50.8
Graduate diploma						526,702	30.6
Master's or Doctorate degree	57,813	2.1				30,880	1.8
Total	2,717,122	100.0	4,280	2,411,347	100.0	1,721,910	100.0
Administrative dependency						Censo Escolar	
Federal	87,431	3.2	54	24,932	1.0	25,363	1.4
State	1,053,489	38.8	1,626	891,510	37.0	725,882	40.7
Municipal	1,573,541	57.9	2,600	1,494,905	62.0	1,097,635	61.5
Public (not specified)	2,661	0.1					
Total	2,717,122		4,280	2,411,347	100.0	1,848,880	103.7
Type of employment relationship						Censo Escolar	
worker registered in the employment and social insurance	113,521	4.2	449	276,020	11.4	16,913	0.9
Statutory civil servant	1,985,414	73.1	2,873	1,615,975	67.0	1,256,226	70.4
temporary / outsourced/ not registered worker	618,187	22.8	958	519,352	21.5	510,550	28.6
Total	2,717,122	100.0	4,280	2,411,347	100.0	1,783,689	100.0
Employment period						Prova Brasil	
One year	664,409	24.5	430	249,769	10.4	7,427	3.2
from 1 to 5 years	523,009	19.2	1,300	745,742	30.9	33,904	14.7
from 6 to 10 years	472,424	17.4	758	425,442	17.6	40,272	17.5
from 1 to15 years	372,484	13.7	590	324,233	13.4	47,930	20.8
from 16 to 20 years	271,241	10.0	487	272,817	11.3	37,611	16.3
More than 20 years	413,555	15.2	715	393,344	16.3	59,523	25.8
No information						3,919	1.7
Total	2,717,122	100.0	4,280	2,411,347	100.0	230,586	100.0
Weekly hours of work (in hours)						Prova Brasil	
<20	122,740	4.5	220	132,323	5.5	4,790	2.1
>=20<40	1,413,574	52.0	2,021	1,180,843	49.0	71,964	31.2
=40	981,124	36.1	1,746	929,040	38.5	79,829	34.6
>40	199,684	7.3	293	169,141	7.0	67,736	29.4
No information						6,267	2.7
Total	2,717,122	100.0	4,280	2,411,347	100.0	230,586	100.0

Source: Authors' elaboration from Rais 2013 microdata and Pnad, Prova Brasil and Censo Escolar information 2013, adapted from Jacomini, Alves and Camargo (2016).

Notes:

(*) The analysis unit is the employment relationship. The employment relationships may be greater than the number of teachers, since a teacher may have more than one employment relationship.

(**)The analysis unit is the teacher. Teachers´ population expanded from PNAD sample.

(***)The analysis unit is the teacher. Teachers´ population counted by Censo Escola or Prova Brasil sample.

This article presents the AR analyzes only about teachers of public basic education networks with *higher education training*, since, according to Morito (2008), Brito and Waltenberg (2014) and Jacomini, Alves and Camargo (2016) and Inep (BRAZIL, 2015), the position of teachers with high school education training is favorable in relation to the other occupations in the labor market in the same training level. It is worth to mention that, according to Censo Escolar 2013, 83.2% of teachers of public network have higher education training. Regarding this cutting number, 11.6 million of formal employment relationship are considered in the analysis. This number draws attention to the fact that workers with higher education training occupy only 15.4% of the country's employment relationship, which reveals the population´s low education level in the formal labor market. It is also worth to mention that teachers, because teaching is a career with many people, represent 23% of the workers with higher education training with employment relationship. AR results and the ratio between groups compared to the national aggregation are shown in Table 2.

TABLE 2
AVERAGE REMUNERATION AND RATIO BETWEEN THE REMUNERATION OF TEACHERS AND OTHER PROFESSIONALS WITH HIGHER EDUCATION TRAINING, WITH 40-HOUR WORKING WEEK, BRAZIL, 2013

Remuneration range		Public school teachers		Other professionals		Ratio teachers/ other occupations
		Employment relationships number	%	Employment relationships number	%	
to 3 ma	[<= R$ 2,034]	478,670	24.5%	2,382,664	28.9%	
> 3 ma <= 6 ma	[R$ 2,034 --| 4,068]	924,205	47.2%	2,333,290	28.3%	
> 6 ma <= 9 ma	[R$ 4,068 --| 6,102]	330,291	16.9%	1,238,185	15.0%	
> 9 ma <= 12 ma	[R$ 6,102 --| 8,136]	112,879	5.8%	726,068	8.8%	
> 12 ma	[> R$ 8,136]	110,645	5.7%	1,562,243	19.0%	
Total		1,956,690	100.0%	8,242,450	100.0%	
Descriptive measures (values in R$)		**Average remuneratio**	**3,576**		**5,227**	**0.68**
		Standard deviation	2,393	Standard deviation	5,157	
		Coefficient of variation	67%	Coefficient of variation	99%	
		Lower quartile	2,053		1,832	1.12
		Meddle quartile	2,903		3,418	0.85
		Upper quartile	4,326		6,654	0.65

Source: Authors' elaboration from Rais 2013 microdata.
Notes: mw - minimum wage

Table 2 values were calculated from remuneration data of 10.1 million employment relationships (1.9 million teachers and 8.2 million other professionals). According to Rais, teachers´ average remuneration for a standardized 40-hour working week was R$ 3,576.00 – which

was equivalent to 5.3 minimum wages (R$ 678.00) in 2013. The studies detailed in Chart 1 revealed AR values around R$ 2,500.00. Thus, AR shown in Table 2 was closer to just the updated value in the study by Moriconi (2008). However, this number needs be cautiously analyzed, since it is the national average of a highly decentralized career, in almost 6,000 public networks with their own local contexts, trajectories and career paths (or absence). Therefore, this number should be seen as an indicator with the potential to point, approximate, reveal or synthesize a phenomenon (JANNUZZI, 2005). In this case, with the limitation of doing so at the national sphere, and not as a number that reflects each and every one of the Brazilian teachers´ remuneration. The greatest potential of this number is perhaps to operationalize a measure to analyze the teachers´ situation in the labor market, in a broad way, according to goal 17: the ratio between both groups´ ARs, which expresses that the teachers´ average remuneration (R$ 3,576.00) is equivalent to 68% of other professionals´ average (R$ 5,227.00). This ratio reveals a worse scenario than that described by the only study that calculated the ratio from Rais – Nascimento, Silva and Silva (2014) found a ratio of 0.80 – and Inep (BRAZIL, 2015), which calculated a ratio of 0.76 (Pnad was used). The indicator is slightly better than that presented by Jacomini, Alves and Camargo (2016), who calculated a ratio of 0.61 and whose methodological procedures allow a more direct comparison (as will be presented later in Table 3).

Considering the limitation of the mean as a descriptive measure, Table 2 initially presents the distribution of the remuneration values of the employment relationship of 1.9 million teachers in intervals of values. It can be observed that 24.5% of teachers had income of up to R$ 2,034.00 or three minimum wages. The largest teachers´ contingent (47%) was in the class that considers the average, that is, more than three to six minimum wages. The classes with values above six minimum wages add up 28.2%. The frequency distribution of other professionals' remuneration shows that 28.9% of them are in the lowest class (up to three minimum wages) and that the classes above six wages add up to 42.8% of professionals.

The coefficients of variation (CV) help to understand the magnitude of the heterogeneity between the same group's remunerations.[14] The variability among teachers´ wages is high (67%) and can be explained by the fact that it is made up of wages of teachers with very different profiles related to: teaching network (federal, state and municipal); training (higher education and graduate); type of employment relationship; working time and period of employment. This measure suggests caution in the conclusions from the national average, as highlighted above. The other professionals' remuneration heterogeneity is still higher (99%). It is reasonable because it computes

14 CV is a measure of variability calculated by dividing the standard deviation by the mean. A CV hypothetically equal to zero would indicate that everyone would have had the same pay. Values up to 15% express very low variation. There is no scale for interpretation and the value may exceed 100% if the standard deviation is greater than the mean.

remunerations of very different occupations of people who work in public and private sectors.

Measure of central tendency (quartiles) also help to understand remuneration inequality within and between compared groups. The lower quartile indicates that teachers with the lowest wages (25% lower) perceived values of up to R$ 2,053.00. This amount, ceiling wages for teachers in this group, is only 13% above the PSPN, which was R$1,817.30 in 2013 (it should be remembered that PSPN is for teachers with a high school training and here they teachers with higher education training). Non-teaching professionals, who accounted for 25% of the lowest wages, received values of up to R$ 1,832.00. That is, by calculating the ratios between the values of the two groups' lower quartile (1.12), it turns out that, among the professionals with higher education training, with lower remuneration, teachers are in a somewhat more favorable position. The median communicates that 50% of the 1.9 million values of the considered teachers' remunerations are up to R$ 2,903.00. This measure of central tendency is used in some studies about teacher's remuneration – such as Gatti and Barretto (2009) – as an alternative to the average, perhaps because it is not susceptible to extreme values. The ratio between medians (0.85) reported that teachers are in an unfavorable position compared to other professionals in the market when considering this measure. Finally, the ratio between the values of the upper quartile (0.65) indicates that the value responsible to signal the professional who is in the group receiving 25% of the highest remunerations among teachers (R$ 4,326.00) is 35% lower than those value among other professionals with the highest salaries (from R$ 6,654.00).

This set of descriptive measures helps to relativize teachers´ AR at national level as an absolute indicator and, at the same time, shows how complex is the task of analyzing the remuneration values of a category as heterogeneous as that of teachers in Brazil. Table 3 presents the results by federation unity (UF) calculated by Jacomini, Alves and Camargo (2016), who used Pnad in perspective with the results obtained by Rais.

The first aspect that calls attention is that the obtained results by Pnad are from 3,178 observations. In disaggregating UF results, it can be observed that, in Roraima, for example, the sample is composed of only 35 teachers and that in 15 states, Pnad teachers' sample does not reach 100 respondents. Because it is a source made up of administrative data, Rais has a census character of the population employed in the formal market. Therefore, the results of Table 3 are derived from almost two million observations and show that Rais 2013 contains data from a number of employment relationships higher than the number of teachers counted in the Censo Escolar in 20 states (except in Amapá, Rondônia, Alagoas, Maranhão, Bahia, Paraíba and Rio Grande do Sul).

TABLE 3
AVERAGE REMUNERATION AND RATIO BETWEEN TEACHERS´ AND OTHER PROFESSIONALS´ REMUNERATIONS WITH HIGHER EDUCATION TRAINING LEVEL AND 40-HOUR WORKING WEEK, PER UF, BRAZIL, 2013

Region	UF	Total teachers Censo Escolar[1]	TEACHERS						OTHER PROFESSIONALS			Ratio UF /Brasil[2] [Pnad]	Ratio UF /Brasil[4] [Rais]
			Pnad[2]			Rais			Rais				
			Pnad sample	remuneration		Total employment relationshi	remuneration		Total employment relationship Rais	remuneration			
				mean (R$)	CV[3]		mean (R$)	CV[3]		mean (R$)	CV[3]		
North	AC	7,255	56	2,872	0.60	13,982	3,700	0.37	19,096	5,459	0.96	0.67	0.71
	AM	29,100	116	2,264	0.34	45,988	2,791	0.55	85,470	5,993	0.99	0.53	0.54
	AP	7,535	54	3,597	0.45	2,017	4,079	0.53	15,990	5,145	1.00	0.84	0.78
	PA	52,553	157	2,446	0.50	62,942	5,727	0.67	142,611	4,954	0.98	0.57	1.10
	RO	13,664	68	2,371	0.31	10,418	2,884	0.45	51,286	4,204	0.95	0.55	0.55
	RR	5,301	35	2,737	0.45	6,973	4,613	0.63	20,013	4,651	0.97	0.64	0.88
	TO	13,638	84	2,375	0.38	20,691	3,130	0.48	41,719	4,575	0.93	0.56	0.60
Northeast	AL	18,033	44	2,607	0.40	13,749	2,747	0.43	51,936	4,405	0.99	0.61	0.53
	BA	86,497	167	2,530	0.46	85,919	3,738	0.68	290,745	4,763	1.03	0.59	0.72
	CE	66,369	166	1,881	0.45	71,356	2,458	0.61	237,679	4,268	1.01	0.44	0.47
	MA	49,224	91	2,712	0.46	44,144	2,529	0.72	76,429	4,317	1.07	0.63	0.49
	PB	31,913	48	2,260	0.45	25,001	2,278	0.58	99,961	3,505	0.98	0.53	0.44
	PE	52,413	120	2,184	0.44	89,916	2,553	0.58	272,197	4,150	1.03	0.51	0.49
	PI	28,986	61	2,296	0.37	36,242	2,367	0.45	62,286	3,761	1.09	0.54	0.45
	RN	22,655	42	2,485	0.32	31,815	2,995	0.58	90,593	4,557	1.03	0.58	0.57
	SE	14,881	50	3,016	0.51	22,473	3,893	0.50	62,272	4,768	1.12	0.71	0.75
Southeast	ES	36,027	73	2,453	0.39	57,988	3,160	0.64	157,678	4,696	0.93	0.57	0.61
	MG	162,719	298	2,405	0.43	230,222	3,464	0.69	734,694	4,531	0.98	0.56	0.66
	RJ	87,633	167	3,190	0.61	138,259	3,768	0.61	912,111	6,319	1.01	0.75	0.72
	SP	303,464	338	2,492	0.48	448,452	3,473	0.57	2,730,205	5,428	0.95	0.58	0.67
South	PR	94,935	217	2,964	0.62	151,803	4,226	0.63	514,931	4,566	0.96	0.69	0.81
	RS	86,088	224	2,654	0.53	67,456	4,502	0.64	418,509	5,403	0.95	0.62	0.86
	SC	55,917	106	2,463	0.37	96,805	3,149	0.50	348,300	4,193	0.92	0.58	0.60
Midwest	DF	19,236	86	5,274	0.42	26,931	7,622	0.31	367,115	8,485	0.79	1.23	1.46
	GO	42,139	132	2,694	0.62	57,401	3,808	0.60	217,308	4,008	0.97	0.63	0.73
	MS	22,449	67	3,263	0.33	38,699	4,673	0.59	95,252	4,704	1.01	0.76	0.90
	MT	27,070	88	2,658	0.43	53,708	2,552	0.64	119,133	4,192	0.94	0.62	0.49
BRASIL		**1,437,694**	**3,178**	**2,613**	**0.53**	**1,951,350**	**3,576**	**0.66**	**8,235,519**	**5,227**	**0.99**	**0.61**	**0.68**

Source: Authors' elaboration from Censo Escolar 2013 microdata and Rais 2013, as well as Pnad 2013 data, presented by Jacomini, Alves and Camargo (2016, p. 24).

Notes:

(1) Total of teachers in the public basic education system with higher education training according to Censo da Educação Básica 2013 (BRASIL, 2017a).

(2) Results presented by Jacomini, Alves and Camargo (2016, p. 24).

(3) Coefficient of Variation = [standard deviation / mean]

(4) Ratio = UF teachers'AR divided by other professionals' AR at the national level (R$ 5,227.00).

At this point, one may reflect on the population coverage, one of the desirable properties for a social indicator, according to Jannuzzi (2005). Pnad has excellent population coverage when considered the population as a whole. However, for specific population groups, there is no guarantee of representativeness (IBGE, 2013). Rais in this sense has the advantage of being a census and, therefore, has the potential to cover teacher´ population, in the networks that reported the data. For a more precise notion, considering teachers´ population public primary

schools, with higher education training, Rais 2013 has a substantial amount of employment relationships in the state networks of 21 UFs.[15]

Regarding the municipal networks, employment relationships have been found of this population in 5,129 municipalities (92.1% of the total municipalities). These numbers refer to another desirable property: territorial disaggregation. The numbers show that, from Rais, it would be possible to calculate ARs for most states and municipalities. Obviously, a more conclusive study on coverage and disaggregation in state and municipal networks is only possible from more studies using base pairing methods, as did Inep (BRAZIL, 2017).

Table 3 presents the ARs and ratios between the ARs of the occupational groups disaggregated by UF (considering all the public networks in each UF). Comparing ARs calculated by Pnad and Rais, it is verified that the AR calculated from Rais at national level is higher by R$ 937.00 (36% higher). However, there is a great variation among UFs. ARs calculated from Rais are lower than Pnad in Maranhão and in Mato Grosso. The results are very close in Alagoas, Paraíba and Piauí. In 10 states, the results are more than the national average (greater than 36%): Roraima, Pará, Bahia, Minas Gerais, São Paulo, Paraná, Rio Grande do Sul, Distrito Federal, Goiás and Mato Grosso do Sul. In Pará, the calculated value is more than twice the value known by Pnad and suggests more detailed analysis. In the other 12 UFs, ARs calculated from Rais are from 13% to 32% higher than the values calculated by Pnad. Regarding the equalization of ARs between the two compared groups, the analysis by Rais at the national level oscillated by 7% for more (from 0.61 by Pnad to 0.68 by Rais). The analysis by UF shows that the variation was in the same proportion of the national number (for more or for less) in 12 UFs. The conclusion regarding the most discrepant equation is in the state of Pará. While by PNAD the ratio in Pará was 0.57, Rais data indicated a ratio of 1.10 (that is, teachers´ AR is higher than the other professionals' AR at 10%). The ratio values oscillate more markedly in Distrito Federal,[16] Roraima and Rio Grande do Sul and less in Maranhão (receded 0.15).

Converging and diverging data regarding the results of the indicators calculated by the two sources under discussion refer to reflections on the other desirable properties of social indicators. In order to be well evaluated in the *validity of concept representation*, it is expected that the AR expresses the average value of the monthly income expressed in the teachers' payslip that are working in the classroom of public elementary schools (gross values: without one-third leave, Christmas bonus and cash discount deduction). Considering that Rais is a collecting information system that aims to generate statistics on the formal labor market, whose respondents are the employers' specialized areas that generate payrolls (secretariats of states and municipalities'

15 Having CBO as base, there were no data about Roraima, Rondônia, Alagoas and Ceará by the identification criteria of primary education teachers with higher education. The number of employment relationships is significantly below the total number of teachers in Maranhão and Rio Grande do Sul states. This fact can be explained by the non-standardization of the teachers registration form in the Rais survey, that is, each body responsible for completing Rais classifies the elementary education teacher in the CBO at its own criteria.

16 Distrito Federal numbers show that teachers have an average income (R$ 7,622.00) above other professionals´ AR at the national level (R$ 5,227.00). However, they have an unfavorable situation in relation to the local labor market in which the other professionals have an AR of R$ 8,485.00. The local ratio is 0.90.

specific personnel department or accounting company that provide services to government bodies). Employers´ specialized areas use a specific electronic system provided by Ministério do Trabalho, with institutional guidelines on how to provide information (BRAZIL, 2016). This source, undoubtedly, has the highlighted potential of being able to collect data that favor the indicated calculation that expresses a closer concept to the one expected. In this aspect, the formulated question for the worker´s income collection in Pnad is not specific and,[17] therefore, it is not possible to know if the answered value is the gross, net, basic wages, etc. Furthermore, when the interest is generating indicators to analyze a specific career, this can be a problem for not being able to capture specificities. In addition, respondent is not always the teacher, since in Pnad it is possible that the respondent is any household resident who may respond to the questionnaire (IBGE, 2013).

The data collection apparatus (information systems, forms, guidelines for filling, respondents, information processing, etc.) refers to the *measurement reliability analysis* (attribute related to confidence in the measure, measurement of the intended aspect in a correct, coherent and constant way). Concerning this issue, two sources, dealing specifically with the challenge of measuring teachers´ AR, there are different challenges: Pnad because it fails to capture the specificities of an occupation in its data collection form;[18] and Rais because it depends on the respondents´ information accuracy. In addition, it presents the challenges of obtaining 100% of the information from all country´s education networks, as already presented. Hence, Rais, for its purpose and the advances it has had regarding population coverage since 2006, seems to be the source that presents more conditions to attend to this question, since a changing in Pnad questionnaire, to meet specific occupation demands, according to the purpose of the research, would not be feasible.

It remains an analysis of the three other desirable properties: operational feasibility; update periodicity; and historical series comparability. It can be stated that both the AR calculated by Rais and the AR calculated by Pnad present the three attributes in a comparable way. There are only a few notes about each source differences. In terms of feasibility, there is absolute equality between sources, since the two microdata sources are available in an open and free way on the internet for users (Rais since 2012). On periodicity, the two sources are annual and, roughly, the AR calculated by the two sources has equality in this question. The only note about Pnad at this point is that it is not held in the same year of decennial Censo Demográfico, which makes a much larger collection and generates similar data. Finally, regarding the historical series comparability, this property relates more with the criteria stability and the meaning measure over time. Because of the use

17
In question 53 of Pnad 2013 questionnaire, the question asked is "What was the monthly income that ___ normally earned in September 2013, in this work (main work)?".

18
Pnad is a consolidated research and has also fulfilled its role of generating reliable socioeconomic information of the Brazilian population since 1967. It is important to emphasize the work value of IBGE team that has been working on this research for decades. Pnad does not have purpose to generate detailed information to meet the specifics of different occupations. In this article, what is meant is to warn about the using of source beyond what it is proposed to.

of the mean as a measure, it does not depend on the source (only if there are problems in population coverage, validity and reliability). However, it should be mentioned that the maintenance of the variables that compose the indicator (and its categories) over time is a fundamental condition to allow the comparison in historical series of the indicator. Since AR is a monetary measure, a historical series analysis should consider the use of a price index to make the values comparable on the same date.

FINAL CONSIDERATIONS

Rais is a too little and only a recently explored source in researching about this theme. Although there are significant differences regarding the purpose and the methodological design for collecting data from Pnad and Rais, regarding PNE 2014-2024, the results in this article, using Rais, point to the same conclusion: public school teachers with higher education training receive a significantly lower remuneration when compared to other professionals with the same level of training.

When results were disaggregated by UF, only Pará´s teachers presented an AR above other professionals´ national average (R$ 5,225.00). This data suggests new confirmatory analyzes with information from local state and local municipal networks. The result of Distrito Federal deserves to be analyzed separately, because it surpasses the national one, but it does not reach the other local professionals´ AR. Supporting Jacomini, Alves and Camargo (2016) understanding, in the context of goal 17 (and not with each UF's average), the comparison of each UF's AR with other professionals' national average is important. This is relevant for that teachers' wage increase do not be based on the dynamics of the labor market and the financing capacity of the subnational education networks. What would maintain the inequality of working conditions of Brazilian teachers and the current situation in the worst contexts. This understanding is in the direction of the PSPN currently applicable only to professionals with high school training.

The analysis of the characteristics of interest indicators, based on the "desirable properties for social indicators" proposed by Jannuzzi (2005), suggests that AR calculated from Rais has some comparative advantages over Pnad. These refer to "validity in concept representation" and "reliability of the measure" aspects, since Rais is a specific survey to capture information on formal employment relationships and establishment of formal employment, in this way, is able to understand specificities that are beyond the Pnad scope. Likewise, the indicators calculated from Rais are highlighted in terms of population coverage and territorial disaggregation due to the census character of the Ministério do Trabalho survey. In these aspects, the household surveys have limits

due to the sampling design that, for certain levels of disaggregation, loses the representativeness of the results.

Despite the comparative advantages, Rais is a source whose broad access to microdata is relatively recent (since 2012). Thus further studies are needed to shed light on some points from this source. One of them in relation to the coverage level of primary school teachers´ population. In this aspect, Inep (BRAZIL, 2017) has performed a relevant pairing work between Rais´ and Censo escolar´s bases and has found a coverage rate of 93.2%. This annual monitoring is important to monitor the source quality in the "population coverage" question. Another challenge to be faced in new studies is the correct identification of teachers through CBO codes. At this point, it is necessary to analyze the situation of networks that divide education professionals into two careers (usually one for early childhood education and another for the other stages of basic education) in the identification of occupational codes for "teachers" and "administrative assistants". Studies of local networks may be important in order to pressure the responsible departments to improve the information accuracy provided in Rais about basic education teachers, as this depends on how each body classifies them within the extensive list of CBO. In addition, it would be desirable to identify only teachers assigned in the classroom with teacher codes and the others with specific codes that reflect their functions outside the classroom, in order not to include wages gains due to bonus by function on the AR.

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