

Distr.: General  
27 October 2017

English

---

## United Nations

### Economic Commission for Europe

#### Conference of European Statisticians

##### Work Session on Gender Statistics

Belgrade, Serbia

29 November – 1 December 2017

Item 5 of the provisional agenda

##### **Economic empowerment and intra-household power**

## Gender wage inequalities in Serbia

Note by Statistical Office of the Republic of Serbia\*

### *Abstract*

The Gender pay gap in unadjusted form (GPG) is an important, internationally comparable indicator that measures discrepancies between men and women regarding earnings. As such, it is used in a number of strategic documents, both national and international, e.g. European employment strategy (EES). The GPG is one of the indicators for monitoring the EU Sustainable Development Strategy which measure progress in the Social inclusion, demography and migration theme. Closing the gender pay gap and promoting equality between women and men are essential to sustainable growth and creating a more equal and cohesive society.

The GPG indicator is based on the methodology of the Structure of Earnings Survey (SES), which was conducted for the first time, as a pilot project, in the Republic of Serbia in 2015. The gap between women's and men's earnings was calculated on the basis of hourly earnings of male and female paid employees for October 2014.

The results of the SES survey can provide some insight into the gender differences on the labour market. Considering distribution of earnings, which shows the relation between the earnings of men and women, it was concluded that there are more women with earnings lower than the average. At the national level, there is a statistically significant difference between the earnings of men and women. The GPG is lower in the private sector compared to the public sector, although some methodological notes should be considered here. The gap

\*Prepared by Ms. Jovana Đerić, Ms. Snežana Svetozarević, Ms. Melinda Tokai

NOTE: The designations employed in this document do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

between women's and men's earnings is also more prominent among employees with the lowest level of education.

Differences in earnings by gender may occur as a result of the different individual labour market characteristics of employed men and women (level of education, occupation, age, length of service, etc.) as well as characteristics of a business entity in which they are employed (economic activity, size and type of ownership). Analysis of the gap between women's and men's earnings can give an overall picture of gender inequalities in terms of earnings, which can lead to adopting adequate measures that can help reduce this gap and improve position of women in the labour market.

## I. Introduction

1. The Gender pay gap (GPG) represents the difference between average hourly earnings of employed men and of employed women as a percentage of average hourly earnings of employed men. This is the unadjusted form of GPG. As an unadjusted indicator, the GPG gives an overall picture of gender inequalities in terms of pay and measures a concept which is broader than the concept underlying the principle of equal pay for equal work [3]. In addition, the overall GPG figure does not take into account differences in individual characteristics of employed men and women, nor can it give an indication of the incidence and level of discrimination or segregation in the labour market [3]. The adjusted GPG can be used as a better approximation of possible discrimination on the labour market, which can be obtained after applying certain econometric methods. In this paper, the decomposition of GPG on explained and unexplained GPG (adjusted GPG) was not done.
2. The GPG is an important, internationally comparable indicator of gender inequality in terms of earnings, and is, as such, used in a number of strategic documents, both national and international, e.g. European employment strategy – EES1. It is one of the key indicators of women's access to economic opportunities and undoubtedly one of the most persistent labour market characteristics globally [2].

## II. Pilot Survey on the Structure of Earnings for 2014 - overview<sup>2</sup>

3. The data presented in this paper are obtained from the four-yearly Structure of Earnings Survey (SES), which was first implemented, as a pilot project, in the Republic of Serbia in 2015, and the data refer to 2014. The survey provides internationally comparable data on earnings<sup>3</sup> according to the individual characteristics of employees and enterprises in which they work. Distribution of earnings, median earnings, gender pay gap, as well as the percentage of low-wage earners, are some of the important indicators that this survey provides.
4. This survey covers active enterprises with at least 10 employees in all sections of activities, except Agriculture, forestry and fishing and Public administration and defence; compulsory social security (NACE Rev. 2: sections B to S excluding O).

---

<sup>1</sup> <http://ec.europa.eu/social/main.jsp?catId=101&langId=en>

<sup>2</sup> Detailed information on pilot SES 2014 can be found on the following link  
<http://pod2.stat.gov.rs/ObjavljenePublikacije/G2017/pdfE/G20176005.pdf>

<sup>3</sup> Earnings are expressed in gross amount, i.e. with accompanying tax and contributions.

5. Employees covered by this survey are those with an employment contract (for a fixed or indefinite period of time) as well as employees who work on the basis of contract on performing temporary and occasional jobs, regardless of whether they work full-time or part-time.
6. Due to a small sample of employees, in this paper, occupational group Skilled agricultural, forestry and fishery workers was grouped with Service and sales workers. Also, persons who work on the basis of a temporary work contract were grouped with employees with fixed-term employment contract.
7. When analysing the data on earnings according to the type of ownership, one has to take into account that, since 1 November 2014, in Serbia started to implement the law by which earnings of the employees in public sector were linearly decreased by 10%, which could not affect the results of this survey. It should also be noted once again that the NACE Rev. 2 section O is not included in the SES survey.
8. The survey was conducted on a two-stage stratified random sample. The units of the first stage were enterprises, and the units of the second stage were employees. The allocated sample had 1,761 enterprises with about 670 thousand employees.
9. Estimate of the total and its standard error, as well as the estimate of the ratio, median and other parameters were calculated using the standard procedure for two-stage stratified sample with simple random sample selected in both stages (Horvitz-Thompson estimates). Final weights were corrected for non-response and treatment of outliers (enterprises which differed significantly from other stratum units according to values of key variables, e.g. had extremely high values for the total number of employees, earnings of employees for October or average earnings per employee).
10. Achieved coefficients of variation were good: for average annual earnings on total it was 1.14%, for average monthly earnings and for average hourly earnings CV was 1.08%. As for the non-sampling errors: the over-coverage rate was estimated to be 2.1% with the overall response rate for employees of 68.5%.

### III. Distribution of earnings

11. The SES represents a rich employer-employee data set which provides the possibility of obtaining the distribution of employees' earnings, as well as the calculation of median earnings. This is very important because, with current data sources, in SORS it was possible just to get average wage.<sup>4</sup> In this paper we observe monthly and hourly earnings for October 2014.
12. The median monthly earnings amounted to 57,002 RSD, which is 15% lower than the average (67,309 RSD). Analyzing hourly wages, it was noticed that there are employees with very high or very low hourly wages. In order to exclude the influence of outliers on the average earnings, we decided to exclude employees with hourly earnings lower than the 1<sup>st</sup> percentile (123.51 RSD) and those who earned wages higher than the 99<sup>th</sup> percentile (1264.85 RSD) of hourly earnings. That reduced dataset was used in further calculation performed in this paper.<sup>5</sup> Of course, exclusion of outliers does not significantly affect the median earnings, because median is a position measure of central tendency, which means that it is less sensitive to the presence of extreme values.

---

<sup>4</sup> However, currently great efforts are being made in SORS, in order to start using data from administrative sources (Tax administration) from the beginning of 2018, from which these analysis would be possible.

<sup>5</sup> The estimated number of employees who received earnings for October 2014 (as on 31 October 2014) was 1,189,300. Reduced dataset consisted of 1,165,447 employees.

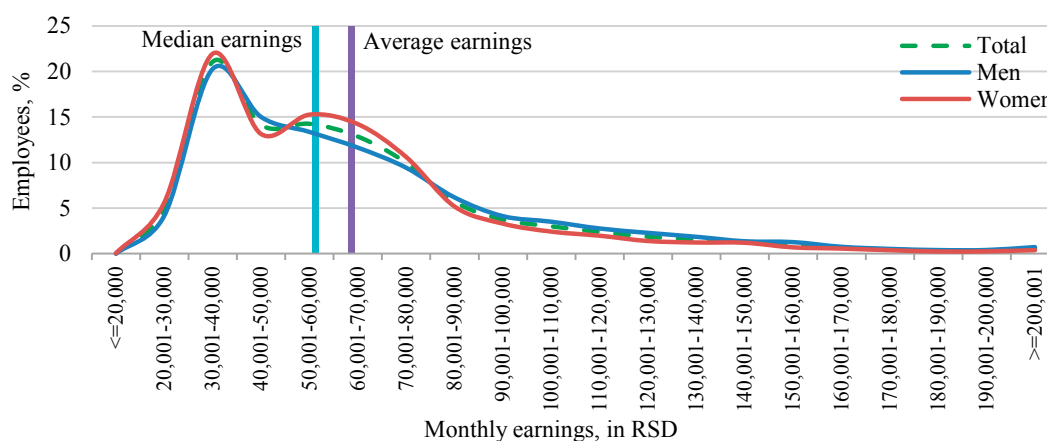
Table 1. Monthly earnings by gender, October 2014

	The whole dataset		Dataset without outliers	
	Average earnings	Median earnings	Average earnings	Median earnings
Total	67,309	57,002	65,006	57,004
Men	70,537	58,006	67,355	57,825
Women	63,651	56,057	62,354	56,211

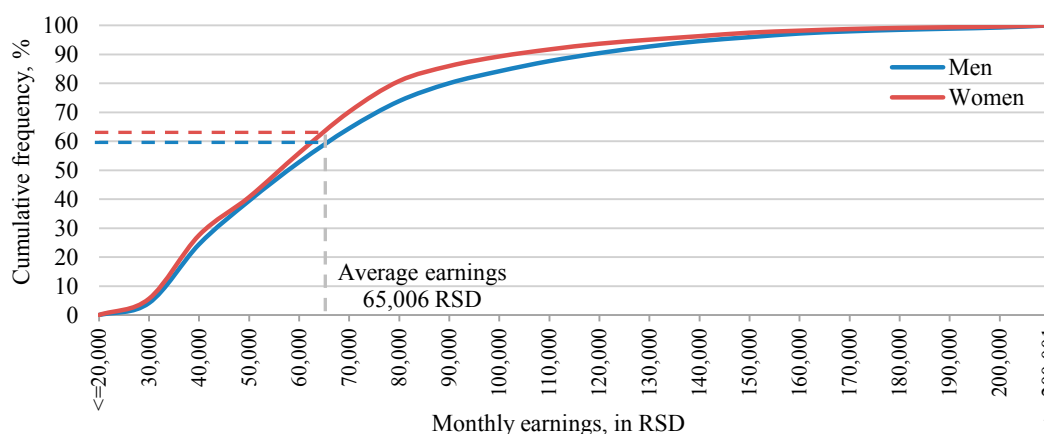
Note: In this paper earnings are given in RSD. Average Exchange Rates could be found on the website of National Bank of Serbia (<https://www.nbs.rs/internet/english/index.html>) - EUR/RSD for 2014 is 117.3.

13. Of the top 1% of employees with the highest hourly earnings, which are excluded from further calculations, about 2/3 are men, while about 1/3 are women. 80% of those employees work in the following sections: Financial and insurance activities; Professional, scientific and technical activities; Information and communication and Manufacturing. 83% of male employees work in enterprises in private ownership, while this is the case for 93% of female employees. As expected, the majority of employees are with the highest level of education and in the first three groups of occupations (Managers, Professionals and Technicians and associate professionals). Also, in this group of highest paid employees prevail persons between 30 and 49 years old, working under indefinite-term employment contract.
14. Of the bottom 1% of employees with the lowest hourly earnings, 46% are men and 54% are women. Majority of men (84%) work in the sections Manufacturing and Construction, while in the case of women 72% work in Wholesale and retail trade; repair of motor vehicles and motorcycles and 19% in Manufacturing. This is consistent with the data by occupational groups where the majority of men are present in the groups of Craft and related trades workers and Elementary occupations, while the majority of women are present in the groups of Service and sales workers (grouped with Skilled agricultural, forestry and fishery workers) and Elementary occupations. 97% of the lowest paid male employees and the same percentage of the lowest paid women work in privately owned enterprises. Also, in this group of the lowest paid employees, most of them are those with no education, with incomplete primary school or primary education and those with secondary education.
15. Graph 1 shows the distribution of monthly earnings by gender, after exclusion of outliers. Distribution of earnings is obviously skewed to the right, which means that the greater number of employees earn wages below the total average, while a very small number of employees have significantly high earnings. This kind of distribution is supported by the fact that the median wage is lower than the average by 12%, i.e. by 14% for men and by 10% for women. Majority of employees (21%) received earnings between 30,001 and 40,000 RSD. For men this percentage is 20%, while for women it is 22%.
16. Density distribution function for women's earnings is above the function for men in almost all of the first seven earnings intervals (earnings below 80,000 RSD), which means that percentually there are more women with lower and medium earnings, while the opposite can be said for earnings above 80,000 RSD. This is also clearly seen from the cumulative distribution of monthly earnings (Graph 2), as the cumulative distribution function of women's wages is above the function for men. For example, 63% of female employees earn wages below the average, while this is the case for 59% of male employees.

Graph 1. Distribution of monthly earnings of employees by gender, October 2014



Graph 2. Cumulative distribution of monthly earnings of employees by gender, October 2014

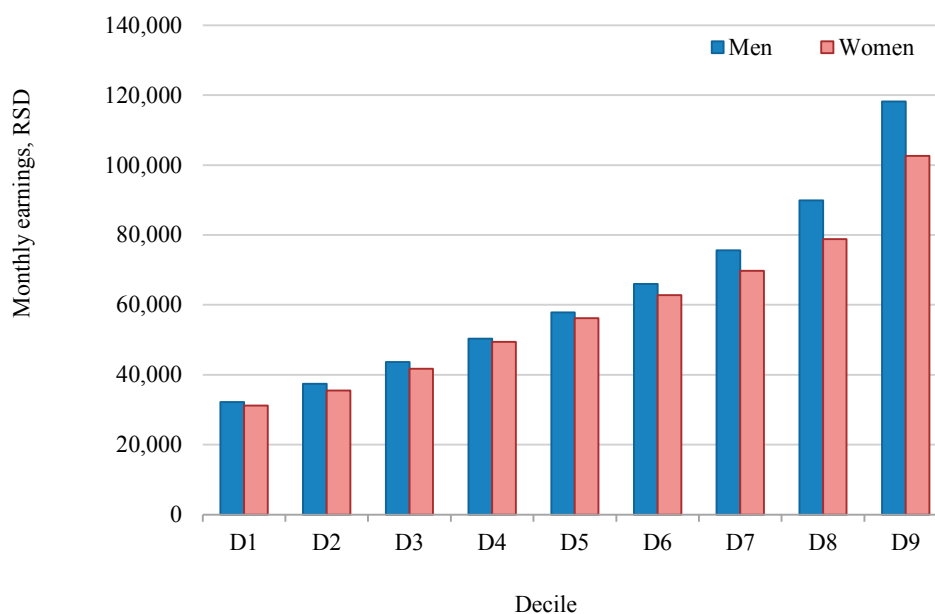


17. Median earnings of employed men amount to 57,825 RSD, which is by 3% higher than median earnings of employed women. This difference is higher when comparing the average earnings of male and female employees, and it is 8.0% in favour of men's earnings.
18. Relative differences in earnings can be measured if the total number of employees is ranked according to the amount of earnings in ascending (or descending) order and divided into ten groups, where each decile group contains 10% of employees. Decile groups are presented in Table 2. The fifth decile (D5) is the median value, which means that 50% of employees received earnings lower than the median, while 50% of employees received earnings higher than the median.

Table 2: Distribution of monthly earnings by gender, October 2014

Decile	RSD		
	Total	Men	Women
1 <sup>st</sup> decile (D1)	31,573	32,198	31,196
2 <sup>nd</sup> decile (D2)	36,512	37,442	35,514
3 <sup>rd</sup> decile (D3)	42,701	43,659	41,678
4 <sup>th</sup> decile (D4)	49,965	50,333	49,414
5 <sup>th</sup> decile (D5)	57,004	57,825	56,211
6 <sup>th</sup> decile (D6)	64,401	65,950	62,770
7 <sup>th</sup> decile (D7)	72,419	75,643	69,788
8 <sup>th</sup> decile (D8)	84,772	89,902	78,838
9 <sup>th</sup> decile (D9)	112,017	118,242	102,605

Graph 3: Distribution of monthly earnings by gender, October 2014

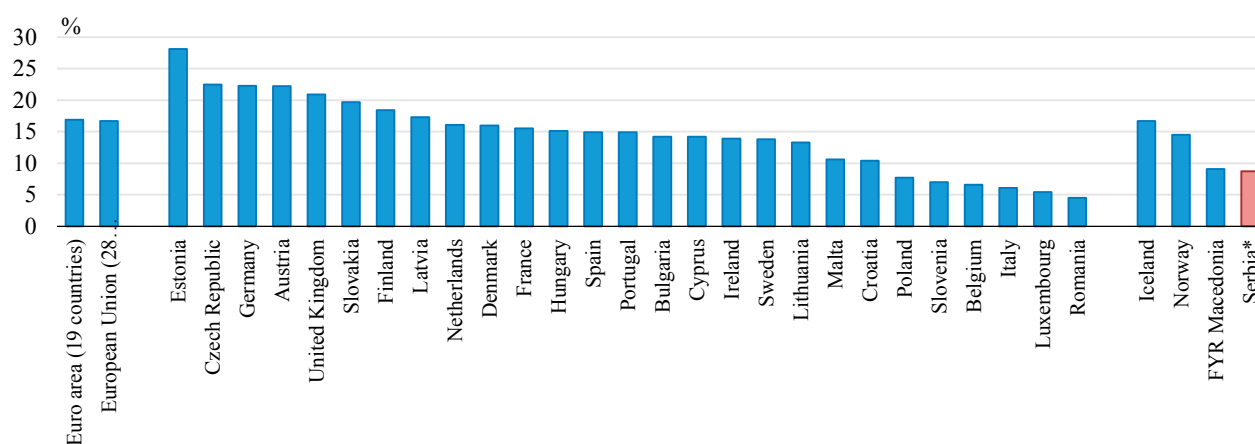


19. Observed by decile groups, the difference between earnings of men and women increases, which also indicates that men are better paid than women. The value of the ninth decile (D9) for women amounts to 102,605 RSD, which is 13% lower than the value of D9 for men (118,242 RSD).
20. The ratio of the ninth and first decile (D9/D1) for women is 3.3, which means that the earnings of the highest paid female employees (from the ninth decile group) are about three times higher than the earnings of the lowest paid female employees (from the first decile group). This interdecile ratio D9/D1 for men is higher and amounts to 3.7.

## IV. Gender pay gap

21. The GPG, calculated on the basis of the whole dataset (without exclusion of outliers) from the pilot survey for 2014, is 8.7% and indicates that women are paid 8.7% less than men, i.e. that the average hourly earnings of women are 91.3% of the average hourly earnings of men.
22. Differences in earnings by gender may occur as a result of a different structure of employed men and women by sections of activities, type of ownership, occupation, education, age and other characteristics.
23. According to the Eurostat data, the GPG in the European Union (28 countries) was 16.7% in 2014. The greatest GPG was in Estonia, where women were, on average, paid 28.1% less than men. The GPG was the least in Romania (4.5%).
24. The GPG in Serbia is 1.7 percentage points lower in comparison to Croatia (10.4%), while for the same number of percentage points is higher in comparison to Slovenia (7.0%). The GPG in Macedonia was 9.1%.

Graph 4. Gender pay gap, international comparison, 2014



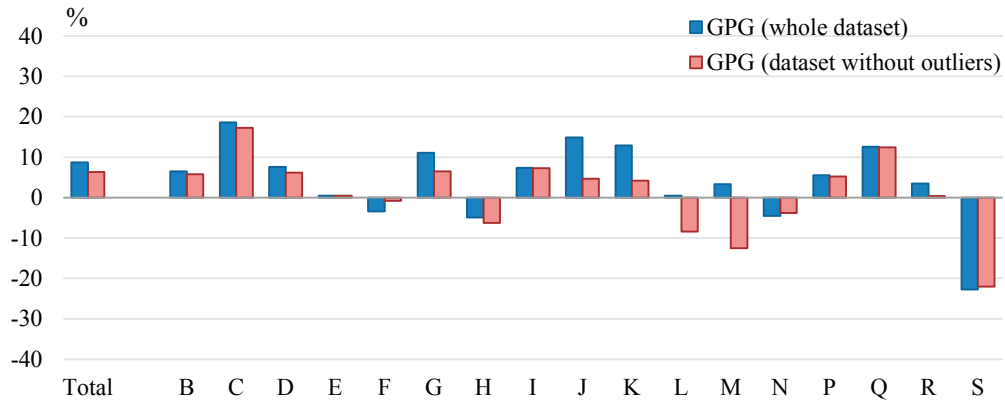
\* The GPG for Serbia was not published on Eurostat website.

Source: Eurostat ([http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=earn\\_gr\\_gpr2&lang=en](http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=earn_gr_gpr2&lang=en), 2 March 2017).

25. After exclusion of outliers, GPG has decreased by 2.4 percentage points and amounted to 6.3%.
26. The GPG in construction is negative (-3.4% on the whole dataset and -0.8% on reduced dataset), which means that women, on average, are better paid than men. But this is supported by the fact that only 18% of employees in this section are women and that they are highly educated, while a lot of men work in lower paid jobs. Taking into account the 95% confidence interval of the GPG estimate, based on the survey results and within the level of significance of 5%, it cannot be concluded that there is a statistically significant difference between the earnings of men and women.
27. The GPG in manufacturing, calculated on a dataset without outliers (17.3%), has not significantly changed in comparison with the gap obtained by the whole dataset. This means that in manufacturing there is a relatively equal percentage of employees with extremely high or low earnings who are excluded from the dataset. This is still the highest difference in earnings in favour of men among all sections observed in this survey. According to the confidence interval for the estimated

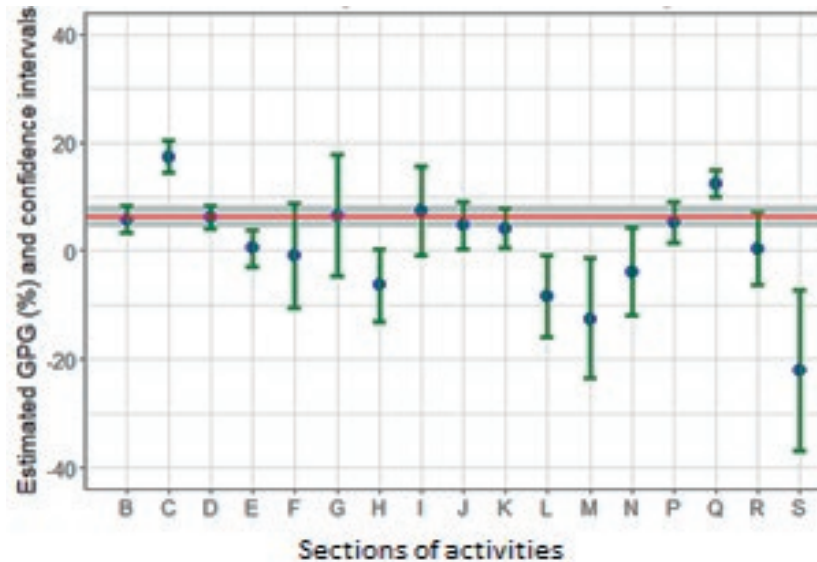
GPG, the difference between men’s and women’s earnings is statistically significant at the significance level of 5%.

Graph 5. Gender pay gap by sections of activities\*, October 2014



\* B - Mining and quarrying; C - Manufacturing; D - Electricity, gas, steam and air conditioning supply; E - Water supply; sewerage, waste management and remediation activities; F - Construction; G - Wholesale and retail trade; repair of motor vehicles and motorcycles; H - Transportation and storage; I - Accommodation and food service activities; J - Information and communication; K - Financial and insurance activities; L - Real estate activities; M - Professional, scientific and technical activities; N - Administrative and support service activities; P - Education; Q - Human health and social work activities; R - Arts, entertainment and recreation; S - Other service activities.

Graph 6. Estimates and confidence intervals for GPG by sections of activities, October 2014

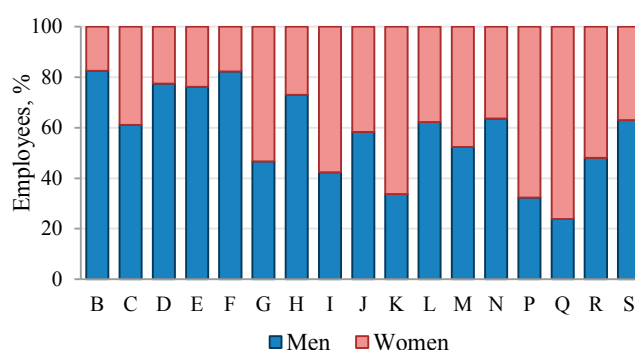


Note: The red line on the graph represents the estimate of GPG for Serbia (6.3%), and the grey area around the red line represents 95% confidence interval for this estimate.

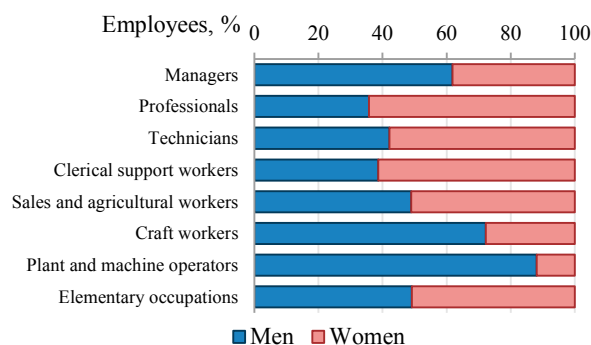


28. Also, estimate of the GPG can be presented on the graph with an upper and lower limit of the 95% confidence interval. The width of the interval shows the precision of estimate. The narrower the confidence interval, the estimate is more precise. If the confidence interval includes the zero value, i.e. if the confidence interval limits are presented with different signs, based on the survey results and at the significance level of 5%, it cannot be concluded whether there is a statistically significant difference between the earnings of men and women. In confidence intervals which do not include zero, that is, if the limits of confidence intervals are presented with the same sign (both positive or both negative), at the significance level of 5%, it can be concluded that there is a statistically significant difference between the earnings of men and women.

Graph 7. Structure of employees by sections of activities and gender, October 2014



Graph 8. Structure of employees by occupational groups and gender, October 2014



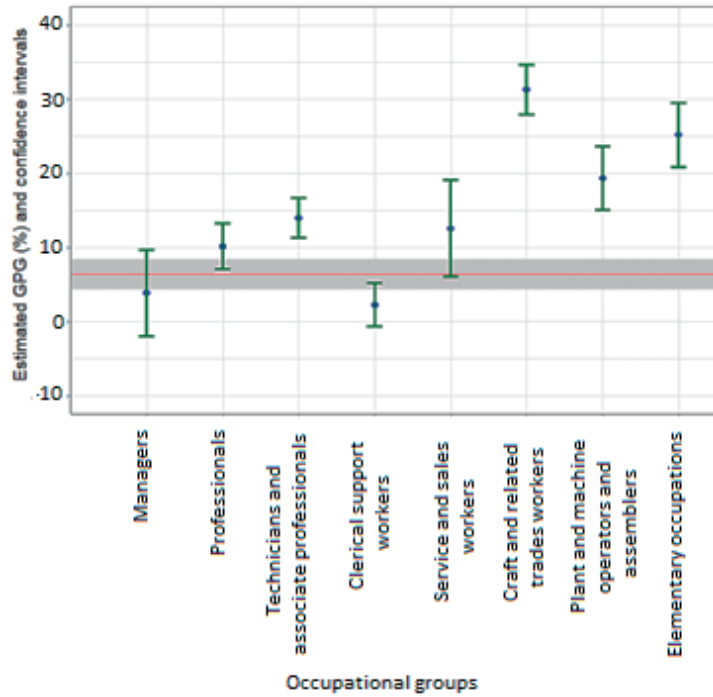
Note: Structure of employees was calculated on the reduced dataset, but does not differ significantly from the structure that is obtained on the whole dataset

29. The GPG in enterprises in public ownership is far greater than in the privately owned enterprises (11.1%, i.e. 6.4%, respectively), which means that, in the public sector, women earn 11.1% less than men, while the situation in the private sector, in terms of the relation between women's and men's earnings, is much better, where women earn 6.4% less than men (close to the value of the overall GPG).
30. Based on our analysis, it can be concluded that the GPG rises along with the increase of the size of the enterprise, i.e. along with the increase in the number of persons employed in the enterprise. We

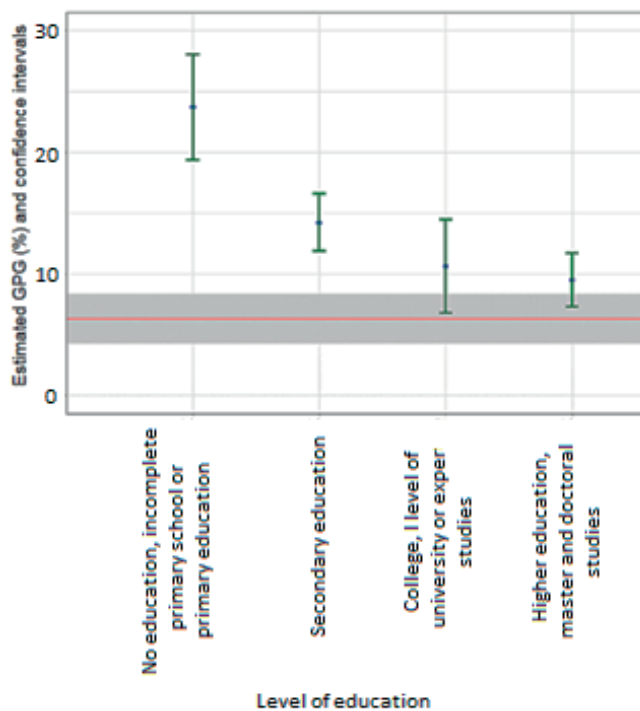
noticed that in all size classes of the enterprise, except the small ones (employing between 10 and 49 employees), women earn less than men, in lesser or greater percentage. Only in small enterprises the GPG has negative value and tells us that women are better paid than men (women's average hourly wage is higher by 10.2% than the men's average).

31. Graphs 9-12 show the estimates of the GPG with 95% confidence intervals for occupational groups, level of education, age groups and length of service in the enterprise.

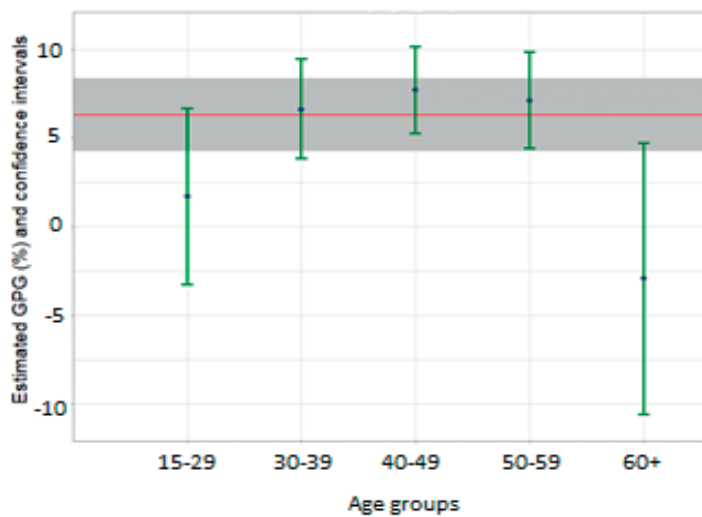
Graph 9. Estimates and confidence intervals for GPG by occupational groups, October 2014



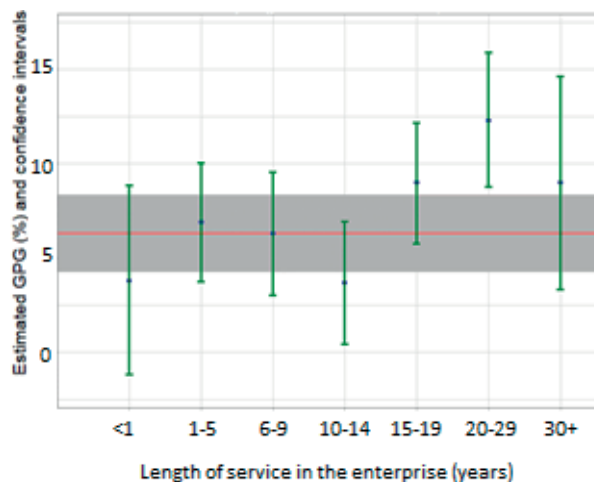
Graph 10. Estimates and confidence intervals for GPG by level of education, October 2014



Graph 11. Estimates and confidence intervals for GPG by age groups, October 2014



Graph 12. Estimates and confidence intervals for GPG by length of service in the enterprise, October 2014



## V. Conclusion

32. In this paper a brief overview of the results of the Pilot Survey on the Structure of Earnings for 2014 was given. Some other analysis could be done on SES data, such as decomposition of the GPG on explained and unexplained part (adjusted GPG), for which methodological explanation can be found in other literature where this issue is thoroughly examined.
33. Compared with other EU countries, the results of SES show that Serbia is among countries with the lowest GPG, which can suggest that in Serbia there is a relatively high level of gender equality when it comes to earnings. However, the reality is probably somewhat different.
34. According to the publication *Gender Pay Gap in the Western Balkan Countries: Evidence from Serbia, Montenegro and Macedonia*, authors suggest that the lower unadjusted GPG can be the result of low female labour market participation and generally their better qualifications compared to men [2]. It can also be added that in Serbia there is a large number of informal employees<sup>6</sup> (mostly women). Also, a relatively high tax wedge and the lack of progressivity in wage taxation may encourage cash-in-hand work, where employers try to avoid paying taxes and contributions on earnings. But, all this cannot be recorded by this survey.
35. As mentioned above, some other analysis and calculation of adjusted GPG could probably show a clearer picture of real wage gap between women and men. But in this case some limitation of SES should be taken into account, such as a potential self-selection problem (because SES only includes individuals in paid employment) and a potential sample selection problem (because employees in small firms, in agriculture and the self-employed are not included in the survey) [3].

<sup>6</sup> According to the LFS definition, informal employees are persons who work without formal employment contract. This category comprises employees in an unregistered enterprise, employees in a registered enterprise, but without formal employment contract and without social and pension insurance, as well as unpaid family members.

## VI. References

1. SORS (2017). "Pilot Survey on the Structure of Earnings for 2014". Retrieved September 25, 2017, from <http://pod2.stat.gov.rs/ObjavljenePublikacije/G2017/pdfE/G20176005.pdf>
2. Avlijaš S., Ivanović N., Vladisavljević M., Vujić S. (2013), "Gender Pay Gap in the Western Balkan Countries: Evidence from Serbia, Montenegro and Macedonia". Belgrade, FREN – Foundation for the Advancement of Economics. Retrieved October 5, 2017, from <http://www.fren.org.rs/sites/default/files/Gender%20pay%20gap%20in%20the%20Western%20balkan%20countries.pdf>
3. Eurostat (2009). "Development of econometric methods to evaluate the Gender pay gap using Structure of Earnings Survey data". Retrieved October 5, 2017, from <http://ec.europa.eu/eurostat/documents/3888793/5845617/KS-RA-09-011-EN.PDF/a9b8bdd0-84cd-494f-9fd6-236727a5afb3?version=1.0>
4. <http://www.stat.gov.rs/WebSite/Default.aspx>
5. <http://ec.europa.eu/eurostat/data/database>
6. [http://ec.europa.eu/eurostat/cache/metadata/en/earn\\_grgpg2\\_esms.htm](http://ec.europa.eu/eurostat/cache/metadata/en/earn_grgpg2_esms.htm)
7. [http://ec.europa.eu/eurostat/cache/metadata/en/earn\\_ses2014\\_esms.htm](http://ec.europa.eu/eurostat/cache/metadata/en/earn_ses2014_esms.htm)