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Financial Determinants of Pharmaceutical Supply for SIS Insured in Pasco Region 2019-2021

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Abstract

One of the most significant concerns in Peru's public health system, given the lack of medicines provided in state health establishments, is that patients make use of their own resources to procure medicines. In this sense, the Integral Health Care Insurance (SIS by its acronym in Spanish for Seguro Integral de Salud) is especially relevant becuase it is the largest public insurance institution in Peru.

The SIS's objective is to providepriority coverage to Peru's most vulnerable through monetary transfers to each regional healthcare Expenditure Entity (UE by its acronym in Spanish for Unidad Ejecutora) through signed agreements. Therefore, the author selected Pasco Region to use as a case study because it is one of the poorest regions of the country.

This study was conducted with the objective of discovering the financial factors that determine the level of pharmaceutical supply in SIS insured people by use of the correlational method. Because the SIS is in charge of carrying out the budget coverage, their principle ability to positively affect pharmaceutical supplies is through financial means. However, the administration of the logistical processes for the acquisition of medicines for SIS insured people is managed by Expenditure Entities that received the financing –at the beginning of every year- And the *UE*s are expected to provide the health products and medicines demanded by the insured.

The paper concludes with a discussion of results and recommendations to better the pharmaceutical supply of SIS Hospitals in Peru through financial means.

Keywords: pharmaceutical supply, financial transfers, budget incorporation, budget Spent, Integral Health Care Insurance

1. Introduction

The Integral Health Care Insurance – *SIS*- is a public institution linked to the Ministry of Health of the Government of Peru that is in charge of managing health insurance funds. The SIS has as a priority to protect the health of the population that is in a situation of poverty and extreme poverty (Seguro Integral de Salud, 2023). From an administrative point of view, the SIS finances Expenditure Entities of the health sector through triennial agreements signed with each of the 25 Regional Governments that comprise Peru (Instituto Nacional de Estadística e Informática, 2023). Thouse agreements establish the obligations of the health provider and the financier that transfers the resources in order to guarantee financial coverage of both the attention of the health services, as well as pharmaceutical products for their insured in order to mitigate expenses. made by the patients themselves given the gap in medicines, the urgency to recover their health, as well as the asymmetry of information, as Hillman postulates (Hillman, 2009, p. 645).

Pasco region is located in the center of the country (Figure 1), and according to the Peruvian Institute of Economy, Pasco is within the three regions with the highest concentration of monetary poverty in Peru during the years 2020 and 2021 with 44.8% and 42.21% of the total population respectively, as evidenced in the interactive dashboard evolution of regional poverty (Instituto Peruano de Economía, 2023). Therefore, the transfers made by the SIS to Expenditure Entities of the Pasco Regional Government, by virtue of the 2019-2021

agreement for the pharmaceutical supply of the 260 health care institutions located in that territory, take on special importance when analyzing the effectiveness of transfers from a results-based management approach. With the intention of ensuring the quality of the spending of the transferred resources, the SIS established that during the 2019 and 2021 period the budget assigned to the Pasco regional government would not be carried out 100% projectively at the beginning of each year, but rather the budget would be transferred to 70%. Subsequently, 30% would be transferred in tranches under compliance with financial objectives and indicators, as well as compliance with regulatory documents that delimited codes of authorized expense classifiers and budget programs to guarantee compliance with prioritizing spending on pharmaceutical products, medical devices and sanitary products. This is referred to by SIS as *First-Order* (Seguro Integral de Salud, 2023).

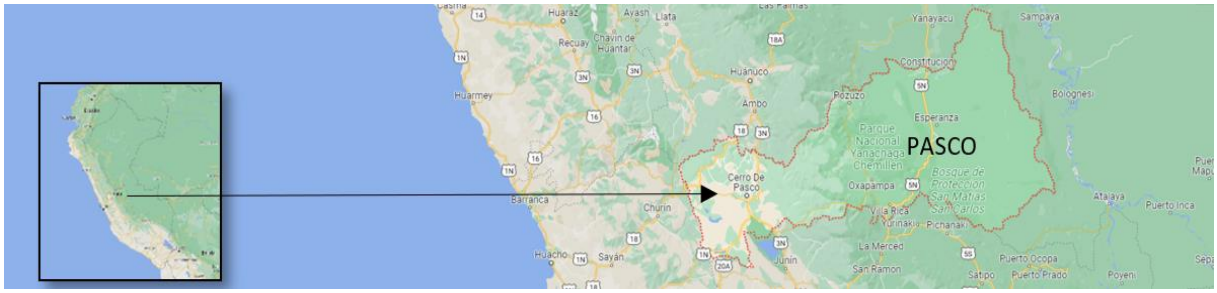

Figure 1. Location map of the Pasco region in Peru (Google, n.d.)

Therefore, the budget monitoring of the resources transferred by the SIS to the Pasco Expenditure Entities during 2019 and 2021 allowed monthly monitoring of metrics such as: the evolution of the amounts transferred, the incorporation of those resources in classification codes of first order expenses according to the annual plan and the total accrued expenses (*devengado*) destined to the first order in that region in Peru. It is appropriate to detail that, within the territory in Pasco region, there are a total of three Expenditure Entities of the health sector that are in charge of managing public resources in a decentralized manner, collecting income and accruing expenses (Ministerio de Economia y Finanzas, 2023).

Table 1. Total health expenditure entities in Pasco Regional Government in Peru

Expenditure Entity Name	Expenditure Entity Code
Dirección Regional de Salud de Pasco: DIRESA Pasco	889
Hospital Daniel Alcides Carrion: HOSPITAL Carrion	890
Unidad Territorial de Salud Oxapampa: UTES Oxapampa	891

A study of these characteristics is appropriate because there is a gap in the academic literature linked to the functioning of the pharmaceutical sector that on the one hand recognizes that pharmaceutical products have contributed to greater life expectancy in Latin American countries, but on the other hand On the other hand, they represent a significant proportion of household spending, especially among the poor, which has been thoroughly investigated by Vargas, Rama, and Singh (2022) for the World Bank. Through this updated publication on the subject, three issues are evident that are responsible for pharmaceutical product policies in Latin America and the Caribbean that must be considered, and precisely one of these issues is the public procurement of medicines.

According to the above, the research carried out aimed to find out if there is statistical evidence that relates in Pasco, during 2019 and 2021, the supply of medicines with the transfers of greater resources, or it is necessary that these resources comply with additional characteristics that anchor the transferred budget to a budget chain oriented to the expected result, based on its incorporation and expenditure in budget classifiers of: medicines, medical devices, vaccines, and among other similar. In this way, by finding better financial determinants of pharmaceutical supply, better decisions can be made regarding i) transferring more and more resources to increase the level of pharmaceutical supply, or ii) transferring most of the resources initially, but setting indicators that encourage the incorporation and expenditure of transfers promptly in thouse specific classifiers related to pharmaceutical supply; because regardless of the financial factor, there are management problems that do not allow a correct orientation of the resources for the established purpose. However, according to the fulfillment of the indicators, the effectiveness is rewarded by transferring the part of the remaining resources.

2. Method

A correlational investigation was proposed because in this way the degree of association between variables or concepts can be determined, as stated by Hernández (2014). Specifically, a regression model with panel data was postulated because by means of this method the same units proposed for the transversal axis (in this case, each Expenditure Entity) are also studied over time, in order to collect a more comprehensive analysis which considers both, the spatial dimension and the temporal dimension (Gujarati & Porter, 2009, p. 591).

To add solidity to the methodology, a follow-up was carried out on the guide for the use and interpretation of panel data prepared by Mayorga and Muñoz (2000) for the Central Bank of Costa Rica with the purpose of distinguishing between the alternatives for specifying a model appropriate, among the panel data, based on a general model.

Initially we must describe the Expenditure Entitities that were considered for the cross section: i) *UE 889 -DIRESA Pasco*, ii) *UE 890 - Hospital Daniel A. Carrión* y iii) *UE 891 - UTES Oxapampa*. Additionally, it should be specified that the time horizon includes the valid observations that exist from May 2019 to December 2021, without considering the months of January of the years 2020 and 2021 due to the fact that the transfers of resources and subsequent budget monitoring begin during the month of February of each year; therefore, there are no valid data for the months of January. It should also be specified that it was not possible to extract information prior to the end of May 2019 due to the fact that there is no data, since the budget monitoring processes and the tools for this purpose were established by the *Resolución Jefatural N.° 072-2019/SIS* dated May 3, with which the Administrative Directive for the Monitoring, Supervision and Follow-up of the fulfillment of the purposes of the transfers of the Integral Health Care Insurance is approved (Seguro Integral de Salud, 2023).

From the foregoing, it can be deduced that 30 months of observation were made for each of the 3 Executing Units, both for the dependent variable and for the three variables that were proposed as explanatory, which are defined below:

-ST: Level of pharmaceutical availability. This is the variable that is intended to be explained from a financial point of view. That indicator is measured by the percentage of available stock of pharmaceuticals, medical devices and the like consumed by SIS patients according to normo stock conditions: available stock covers a consumption demand between 2 to 6 months (≥ 2 and ≤ 6) for care of the SIS insured, overstock: available stock covers a consumption demand greater than 6 months (> 6) and No rotation: those products with adjusted monthly average consumption SIS = 0. The information is extracted from the Integrated Consumption Report (ICI for its acronym in Spanish) reported monthly by all health establishments in Peru to *Dirección General de Medicamentos Insumos y Drogas* (DIGEMID, 2023)

The explanatory variables that were planted in this investigation as determinants of the level of pharmaceutical supply were three:

-TR: Finacial Transfers. The SIS defines the transfers of the Budgetary Framework as the amount constituted by the balance and the financial transfers that are made within the framework of the signed agreements (Seguro Integral de Salud, 2019). This information is collected monthly of the Financial Management Boards of SIS. (Seguro Integral de Salud, 2022)

-IP: Incorporation in first order replacement expenses. It results from the sum of the budget amounts incorporated, according to the annual plan, only in the budget classifier codes corresponding to the first-order replacement expense:

- 2.3.18.12 Medicines
- 2.3.18.21 Material, Supplies, Instruments and Medical Accessories
- 2.3.18.11 Vaccinations
- 2.3.199.12 Chemical Products
- 2.3.18.199 Other Similar Products

-DP: *First-order* replacement expenses. As established by the Ministry of Economy of Peru, the progress of funds executed in public entities is calculated based on the stage *devengado* of spending, which consists of the formal recognition of a payment obligation that must be affected by the budget of the institution (Ministerio de Economia y Finanzas, 2023). The monthly information reflected by each UE of the Financial Management Boards of SIS portal was collected, which results from the sum of the amounts consigned in the *devengado* phase only in the budget classifiers corresponding to first-order replacement expenses, previously described.

Taking into account which were the three Expenditure Entities of the analysis for the cross-section, the 30-month period for the time series, and the variables defined for the collection of quantitative information, the data were organized under the panel data structure, as described shown in Table 2.

Table 2. Panel data structure for regression

N°	Code	Month: id	ST	TR	IP	DP
1	889	2019m5	65.06%	S/ 4,242,792	S/2,691,357	S/ 401,543
2	889	2019m6	68.66%	S/ 4,260,292	S/ 2,691,357	S/ 544,708
…	…	…	…	…	…	…
30	889	2021m12	88.95%	S/ 4,014,249	S/ 2,699,201	S/ 1,709,909
31	890	2019m5	67.77%	S/ 1,639,779	S/ 1,243,822	S/ 525,347
32	890	2019m6	63.06%	S/ 1,639,779	S/ 1,243,822	S/ 542,741
…	…	…	…	…	…	…
60	890	2021m12	91.91%	S/ 3,543,667	S/ 2,638,125	S/ 1,105,160
61	891	2019m5	57.28%	S/ 5,910,042	S/ 2,781,695	S/893,529
62	891	2019m6	70.46%	S/ 5,934,602	S/ 2,786,506	S/ 1,186,710
…	…	…	…	…	…	…
90	891	2021m12	86.57%	S/ 5,373,782	S/ 2,414,731	S/1,786,386

Regarding data processing, the statistical software package STATA was used since it has a large dialog box that contains almost all the official commands, as well as a syntax review window, as recognized by Baum (2006). Despite this, it was important to adjust the initial programming regarding the following aspects:

The time series contains 30 months, but it does not start in the month of January 2021. Therefore, the id label that concatenates the year and the month of the observations was built, for example: 2019m5 refers to the month of May of the year 2019 and 2021m12 corresponds to December 2021. hen, the variables of the *UE* groups were categorized under the commands: *gen id=monthly(YEAR, "YM")* and *tsset id,monthly.* To which STATA responded by recognizing the time series of *id* as monthly data and strongly balanced for the cross-sectional data of the 3 *UE* groups as evidenced in Figure 2.

```
. xtset ue id
       panel variable:  ue (strongly balanced)
        time variable:  id, 2019m5 to 2021m12
                delta:  1 month
```

Figure 2. Panel data programming for the 2019-2021 time horizon

Then, a logarithm is applied to smooth the series because the dependent variable is expressed as a percentage 0%-100% (pharmaceutical supply indicator) and the dependent variables are expressed in Peruvian soles S/ (budget amounts transferred, incorporated and spent). Therefore, the STATA commands were applied:

lST= Log(ST) lTR= Log(TR) lIP= Log(IP) lDP= Log(DP)

At this point it is important to indicate that this transformation introduced us to a functional form model of the Log-Log type:

$$\%\Delta y = \beta_1 \%\Delta x \quad (1)$$

as Wooldridge (2013) indicates, with a dependent variable log(y) and independent variables of the form log(x), which changes the interpretation of the results regarding correlations of the functional level-level type:

$$\Delta y = \beta_1 \Delta x \quad (2)$$

This is because in the Log-Log functional type an elasticity model is established in which the correlation must be interpreted as the relationship that exists between the elasticity of the dependent variable with respect to the elasticities of the explanatory variables. Understanding elasticity in the sense of Mankiw (2018) as a measure of the responsiveness of a variable to a percentage change that could arise in any of its determinants.

Additionally, the methodology of a correlational type of panel data research led us to perform various tests that had to be addressed to validate the econometric model (Baltagi, 2005).

To verify that it was better to use the Data Panel model compared to the alternative of using an OLS (Ordinary Least Squares) model within a linear regression, the Pesaran test was applied (Hsiao & Pesaran, 2004), so if the p-value is greater than 0.05, then the null hypothesis H_0 is accepted: OLS must be used. Otherwise, if the p-value is less than 0.05, then the null hypothesis is rejected and the alternative hypothesis H_1: Use panel data is accepted.

It then had to be decided whether it was appropriate to use a fixed effects or random effects type of model in the panel. Therefore, the Hausman Test was performed and, as Gujarati and Porter (2009) remind us, if the null hypothesis is rejected, then the conclusion is that the Random Effects Model is not appropriate. Conversely, if the value of the Hausman test is greater than 0.05, then the null hypothesis H_0: Use random effects is accepted.

Subsequently, the Wooldridge autocorrelation test was performed. We establish that if the test value is greater than 0.05, then the null hypothesis H_0 is accepted: There is no first-order autocorrelation. Otherwise, if the p-value is less than 0.05, then the null hypothesis is rejected and the alternative hypothesis H_1 is accepted: There is autocorrelation.

Finally, the Modified Wald Test was used to assess the existence of heteroskedasticity. We establish that if the test value is greater than 0.05, then the null hypothesis H_0 is accepted: There is no heteroscedasticity. Otherwise, if the p-value is less than 0.05, then the null hypothesis is rejected and the alternative hypothesis H_1 is accepted: There is heteroskedasticity.

3. Results

First, a correlation matrix between the variables was created using the STATA command: *pwcorr lST lTR lIP lDP,* and according to Table 3, a correlation is obtained between *lTR* and lIP, which was best evaluated using the Wooldridge Test.

Table 3. Correlation matrix between variables lST, lTR, lIP y lDP

	lST	lTR	lTP	lDP
lST	1.0000			
lTR	0.0713	1.0000		
	0.4924			
lTP	0.0650	0.9799	1.0000	
	0.5312	0.0000		
lDP	0.0974	0.3741	0.3789	1.0000
	0.3933	0.0007	0.0006	

Subsequently, the Pesaran Test is performed to choose between an Ordinary Least Squares OLS model or a panel data model, for which the command is run: *xtcsd, pesaran abs* and STATA returned P=0.0000 as a result, so since p-value is less than 0.05, then the null hypothesis is rejected and the alternative hypothesis H_1 is accepted. This result allowed us to continue the investigation through the use of panel data, as evidenced in Figure 3.

```
. xtcsd, pesaran abs

Pesaran's test of cross sectional independence =     6.337, Pr = 0.0000

Average absolute value of the off-diagonal elements =     0.733
```

Figure 3. Pesaran test

After determining that it was appropriate to perform the correlation analysis using panel data, it was necessary to decide between a fixed effects model or random effects in the panel, so the Hausman test was performed. For this, a regression with fixed effects was first carried out and the errors were saved (Table 4).

Table 4. Panel regression considering fixed effects

R-sq:				Obs per group:		
	within	= 0.0311			min =	24
	between	= 0.2101			avg =	26.3
	overall	= 0.0007			max =	28
				F(3,73)	=	0.78
	corr(u_i, Xb)	= -0.8665		Prob > F	=	0.5081
lST	Coef .	Std. Err .	t	P > |t|	[95% Conf.	Interval]
lTR	-.1984999	.2385951	-0.83	0.408	-.6740193	.2770194
lIP	.1662391	.2693417	0.62	0.539	-.3705581	.7030363
lDP	.0141702	.0118496	1.20	0.236	-.009446	.0377864
_cons	4.730179	.8176582	5.79	0.000	3.100588	6.359769
sigma_u	.07689465					
sigma_e	.11619959					
rho	.30454526	(fraction of variance due to u_i)				
F test that all u_i=0: F(2, 73) = 2.00						Prob > F = 0.1421
. estimates store FE						

Subsequently, an estimation with random effects was carried out and the errors were saved, which is shown in Table 5.

Table 5. Panel regression considering random effects

Group variable: ue				Number of groups	=	3
R-sq:				Obs per group:		
	within	= 0.0025			min =	24
	between	= 0.9974			avg =	26.3
	overall	= 0.0247			max =	28
				Wald chi2(3)	=	1.90
	corr(u_i, Xb)	= 0 (assumed)		Pro > chi2	=	0.5939
lST	Coef .	Std. Err .	z	P > |z|	[95% Conf.	Interval]
lTR	-.0836592	.1028911	-0.81	0.416	-.2853221	.1180036
lIP	.1310177	.1392537	0.94	0.347	-.1419146	.40395
lDP	.0058966	.0111406	0.53	0.597	-.0159384	.0277317
_cons	3.640997	.5785016	6.29	0.000	2.507154	4.774839
sigma_u	0					
sigma_e	.11619959					
rho	0	(fraction of variance due to u_i)				
. estimates store RE						

Finally, the comparison of the estimates was made using the Hausman Test and it was analyzed that if the value of the test is greater than 0.05, then the null hypothesis H_0 should be accepted, which suggests using random effects. On the contrary, if the value of the Hausman test is less than 0.05, then the null hypothesis is rejected and the alternative hypothesis H_1 is accepted, it is correct to use fixed effects (Table 6).

Table 6. Hausman Test

	Coefficients			
	(b)	(B)	(b-B)	sqrt(diag(V b-V_B))
	FE	RE	Difference	S.E.
lTR	-.1948407	-.0836592	-.1148407	.2152697
lIP	. 1662391	. 1310177	.0352214	.2305501
lDP	.0141702	.0058966	.0082736	.0040374

b = consistent under Ho and Ha; obtained from xtreg

B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(3) = (b-B) ' [(V b-V B)^(-1)](b-B}

= 4.07

Prob›chi2 = 0.2536

(V b-V B is not positive definite)

As evidenced in Table 6, the value of the Hausman test was 0.2536, that is, it was greater than 0.05 and the null hypothesis H_0 had to be accepted: use a panel model with random effects in the investigation.

Subsequently, the Wooldridge autocorrelation test was performed. We establish that if the test value is greater than 0.05, then the null hypothesis H_0 is accepted: There is no first-order autocorrelation. Otherwise, if the p-value is less than 0.05, then the null hypothesis is rejected and the alternative hypothesis H_1 is accepted: There is autocorrelation, so the STATA regression command for random effects is run: *findit xtserial xtreg lST lTR lIP lD, re xtserial lST lTR lIP lD, output;*and the software provides the results of Table 7.

From Table 7, the p-value of 0.1365 was obtained, that is, it was greater than 0.05. Therefore, the null hypothesis H_0 was accepted: There is no first-order autocorrelation in the panel data model with random effects.

Table 7. Wooldridge test for autocorrelation

Linear regression				Number of obs	=	70
				F(2, 2)	=	.
				Prob › F	=	.
				R- squared	=	0.0254
				Root MSE	=	.07123
				(Std. Err. adjusted for 3 clusters in ue)		
D.lST	Coef.	Robust Std. Err.	t	P› | t |	[95% Conf.	Interval]
lTR						
D1.	-.0192928	.2203607	-0.09	0.938	-.9674283	.9288427
lIP						
D1.	.0084502	.2398249	0.04	0.975	-1.023433	1.040333
lDP						
D1.	.0140061	.0023057	6.07	0.026	.0040854	.0239267
Wooldridge test for autocorrelation in panel data						
H0: no first-order autocorre1ation						
F(1, 2)	=	5.864				
Prob › F -	=	0.1365				

Next, the Modified Wald Test was used to evaluate the existence of heteroskedasticity, for which the STATA commands were run: *findit xttest3 xtreg lST lTR lIP lD, fe xttest3 lST lTR lIP lD.* Como resultado se obtienen los valores de Figure 3 donde el p-value es 0.0308, mayor a 0.05; por lo tanto, se aceptó la hipótesis alterna H_1 was accepted: There is heteroskedasticity in the model.

```
Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model

H0: sigma(i)^2 = sigma^2 for all i

chi2 (3)  =        8.89
Prob>chi2 =      0.0308
```

Figure 3. Wald's Modified Test

Given this drawback, a robust covariance matrix was used. (Davidson & MacKinno, 2003) to correct for heteroskedasticity using STATA command: *xtpcse lST lTR lIP Ld, het*. We proceeded to analyze the data of the resulting model in Table 8.

Table 8. Model regression with heteroscedasticity correction

Linear regression, heteroskedastic panels corrected standard errors						
Group variable:	ue			Number of obs	=	79
Time variable:	id			Number of groups	=	3
Panels:	heteroskedastic (unbalanced)			Obs per group:		
Autocorrelation:	no autocorrelation				min =	24
					avg =	26.333333
					max =	28
Estimated covariances	=	3		R-squared	=	0.0247
Estimated autorrelations	=	0		Wald chi2(3)	=	2.19
Estimated coefficients	=	4		Pro > chi2	=	0.5345
lST	Coef .	Het-corrected Std. Err.	z	P > |z|	[95% Conf.	Interval]
lTR	-.0836592	.1016702	-0.82	0.411	-.2829291	.1156106
lIP	.1310177	.1338551	0.98	0.328	-.1313333	.3933688
lDP	.0058966	.0103645	0.57	0.569	-.0144174	0.262106
_cons	3.640997	.5358512	6.79	0.000	2.590748	4.691246

From the resulting model, it was possible to observe that, for the analysis of panel data with random effects, a model without autocorrelation, without heteroskedasticity, was obtained, which reduced its valid observations to 79 and that contemplates the 3 cross-sectional groups that correspond to the 3 health care Expenditure Entities of the Pasco Rregional Government that were financed by Integral Health Care Insurance between 2019 and 2021.

Finally, the result of the coefficients of the correlation analysis between the logarithm of the explanatory variables and the logarithm of the dependent variable was analyzed, verifying that both the logarithm of the budget incorporation and the logarithm of the accrued expenses in first-order (*devengado)*, keep a positive relationship (coefficients 0.1310177 and 0.0058966, respectively). However, counterintuitively, the logarithm of financial resources transferred by the SIS are inversely related to the logarithm of pharmaceutical supply (coefficient -0.836592). In other words, there is statistical evidence to determine that between 2019 and 2021 the elasticity of pharmaceutical supply in the Pasco region was directly related to the budget incorporation and the spent on *devengado* stage, both in the first-order of the resources transferred by the Integral Health Care Insurance (SIS) for the acquisition of pharmaceutical products, medical devices, health products and other similar products. In contrast, there is also statistical evidence to affirm that the percentage variations of the merely transferred resources did not contribute positively to the percentage variations of the pharmaceutical supply, in Pasco region between 2019 and 2021. Therefore, according to the results obtained in the investigation carried out, it can be affirmed that the variables that have contributed to determine the increase in pharmaceutical supply in the Pasco region of Peru between 2019 and 2021 have been both i) the increase in resources incorporated into the budget classifiers of pharmaceutical products, medical devices, sanitary products and other similar products which come from the SIS, such as ii) the increase in resources accrued (*devengado*) in the budget classifiers of pharmaceutical products, medical devices, sanitary products and other similar products. Therefore, increasing the transfers of Comprehensive Health Insurance to the Pasco region between 2019 and 2021without anchoring them to management indicators that show an increase in incorporation and spending, has been detrimental to the pharmaceutical supply in that region.

These results, in the Pasco region of Peru, are not implausible in themselves because as Atun (2005) maintains in his analysis of Health System Reform in Latin America: health system reforms have been focused on universal health coverage. for the last 20 years. However, the effectiveness of that coverage, in terms of the supply of medicines, is problematic based on the results obtained since it should not only be focused on the quantitative aspect of the provision of financial resources, but also on the qualitative aspect regarding the final destination of that resources with respect to the purpose for which they were initially transferred. This has also been reinforced by the World Bank through Dmytraczenko and Almeida (2015) where it was established that the reforms that Latin America have been accompanied by an increase in public spending on health which were explicitly directed at the population without the ability to pay. This shows a task carried out half-heartedly, since it complies with the first-order structural reforms in terms of coverage and financing of the insured with lower resources, but it is not included in second-order reforms regarding the monitoring of the quality of spending in which is incurred. All the more reason if, in the sense of Cid and Del Riego (2021), the levels of financial protection in health within Latin American and Caribbean countries are related to the level of out-of-pocket health spending in households in that region with a predominance of spending on medicines.

4. Discussion

The conclusion that more transferred resources are related to less medicine supply in between 2019 and 2021brings us back to an open discussion about the inefficiency of public spending in Latin American countries. There are those who request larger budget transfers to deal with security, education and health problems. For example, during April 2023, the Minister of Health of Peru requested that the SIS transfer 100% of the resources to the executing Units of Peru in order to supply supplies and medicines to all regions of the country (Ministry of Health, 2023). However, there are studies that reveal a propensity to increase public spending on health, but a downward trend in the expected results. An analysis of the efficiency of public spending between 2000 and 2017 prepared by Paz (2021) informs us that countries such as Argentina, Uruguay and Cuba presented high public spending on health per capita, but in the case of the first two they failed to obtain the highest efficiency score in any year and, in contrast, some countries with a lower level of spending were placed in the group of efficient countries. This is mainly due to the results obtained in the indicators of life expectancy and infant mortality. Therefore, it is advisable to contribute to this discussion studies regarding the quality of Public Health Expenditure. In the particular case of this research, for example, the executing units evaluated within Peru could be increased and the observations of several Macroregions understood or a broader time horizon used in order to strengthen the orientation of the conclusions regarding which financial variables positively contribute to increasing the levels of medicines available to the insured of the *SIS* in Peru.

It is suggested to future researchers to propose other indicators that can be considered asfinancial variables to contribute to the correct orientation of the resources destined to the acquisition of pharmaceutical products, medical devices and inputs and the like. And carry out studies that provide conclusions that serve as a basis for the normative documents that the SIS could implement regarding the monitoring of the use of transferred resources. However, with the results, it is maintained that to have a significant impact on increasing the supply of medicines in the health establishments of the regional government of Pasco that serve SIS patients, it has been necessary to encourage and regulate the use of incorporation indicators of budget in first-order budget classifiers and also the indicator of the *devengado* stage of public spending, in order to make greater transfers and meet the final objective of delivering medicines to patients who require them in a timely manner.

From another point of view, it is evident that there is not only a problem of perception, as Lora (2011) has exhausted in her research on perceptions of health issues in Latin America, where it is highlighted that those groups with lower incomes recognize greater health problems, although they turn out to be less tolerant of some of these problems compared to the rich. But by carrying out an analysis with panel data for three public health spending entities that supply medicines to more than 260 state health establishments over a three-year time horizon, it reduces the uncertainty that we are facing a tangible and demonstrable problem that, from a financial point of view, it can be combated with second-order reforms focused on incorporation goals closely linked to medicines budget codes and results-oriented management that conditions the transfer of greater resources to the fulfillment of goals derived in the reduction of out-of-pocket expenses of SIS policyholders.

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