

# Factors Associated with the Waste of Health Resources Allocated by the Federal Government to the Municipalities Audited by the Office of the Comptroller General\*

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Received on 10.31.2012 - Desk Acceptance on 11.5.2012 - 2<sup>nd</sup> version approved on 10.2.2013

## ABSTRACT

This study addresses factors associated with active (corruption) and passive (inefficiency) waste that occur in the process of public management and focuses on public health expenditure. Seeking to draw attention to the occurrence of passive waste, this study investigated the following question: what factors of active and passive waste are associated with irregularities in the management of the funds allocated by the Federal Government to Brazilian municipalities for healthcare in 2010? Empirical evidence relating to 102 audited municipalities was obtained from the audit reports of the Office of the Comptroller General (Controladoria Geral da União - CGU), which was established in 2010. Three variables were analyzed for the identification of active waste, and 17 variables were used for passive waste. Data pertaining to the variables were subjected to factor analysis and grouped into factors statistically associated with irregularities in the management of public health funds in the audited municipalities. For active waste, the study results did not show an adequate level of significance, whereas for passive waste, three factors were identified: Factor 1, Administrative Inadequacy, which included the variables “non-payment of taxes”, “non-occurrence of matching funds” and “mismanagement”; Factor 2, Weak Supervision, which included the variables “lack of or poor performance of the council” and “fractional bidding” and Factor 3, Low Level of Compliance, which included the variables “irregular bidding” and “irregularities not related to the mayor”. The main conclusion of the study is the identification of the need to implement governance mechanisms in the public sector that could reduce active and passive waste.

**Keywords:** Public funds management, active waste, passive waste, factor analysis, public governance.

\*Paper presented at the V ANPAD Public Administration and Governance Meeting, Salvador, November 2012.

## 1 INTRODUCTION

Following the unification of the Brazilian health system with the implementation of the Unified Health System (Sistema Único de Saúde, SUS) in 1988, the system ceased to be the responsibility of several ministries. The management of the SUS was decentralized and no longer exclusive to the Federal Executive Branch, making it the responsibility of state and municipal administrations. To that end, states and municipalities now receive federal funds to be applied to government programs and actions. SUS data are striking; the system carries out 2.8 billion outpatient procedures, 19,000 transplants, 236,000 heart surgeries, 9.7 million chemotherapy and radiotherapy procedures and 11 million hospitalizations annually (Portal Brasil, 2009).

The numbers cited above are of course significant, especially if one considers that the amount paid directly by the population served is zero. However, the public health system in Brazil still faces problems. Magazines, newspapers and news broadcasting frequently report corruption<sup>1</sup> at the municipal, state, national and international levels. Examples, both old and new, abound on the subject, such as the case that came to light in 2011 regarding the Hospital Complex of Sorocaba (Conjunto Hospitalar de Sorocaba, São Paulo), which is responsible for serving 48 municipalities in the region. After an operation by the Public Ministry in conjunction with the Civil Police of Sorocaba, 12 people (including directors, physicians and dentists) who were suspected of fraudulent bids and of diverting funds from public health were arrested (Benites, 2011).

At the same time, acting as a silent disease, another type of waste of public funds exists that cannot be disregarded: the inefficiency<sup>2</sup> of public management (also called mismanagement or, in this study, “passive waste”). This type of inefficiency may involve work that lasts for months longer than planned, medicines that are purchased but not distributed before expiry, the absence of effective use of equipment received, or other types of mismanagement (Controladoria Geral da União, 2011). Unlike corruption, this second type of waste receives little attention in the media or even in academic papers. However, a recent study by Bandiera, Prat and Valletti (2009) showed that, in Italy, passive waste represented 83% of the total waste of public money that occurred with respect to the acquisition of goods.

According to Ferraz, Finan and Moreira (2008, p. 2), such diversions of funds in areas of education, health and sanitation “... generate high costs to society because they reduce the accumulation of human capital and accentuate inequality given that poorer households depend more on public services.”

There is some degree of consensus that Brazil’s health service is one of the most important public services pro-

vided to the population. This was demonstrated in a study conducted by the Research Institute for Supplementary Health (Instituto de Estudos de Saúde Suplementar, IESS) in eight Brazilian metropolitan areas. The study concluded that after home ownership the second most sought-after goal of the average Brazilian is to provide his or her family with a health plan (Rose, 2011).

That the importance of public health is recognized by the government is shown by the fact that public health is the subject of one of the thirteen Government Guidelines. The current President of Brazil, Dilma Rousseff, pledged in target nine “to universalize health and guarantee the quality of care in SUS”. The priority of this target, according to Portal Brasil (2011), is to improve “SUS and the management, supervision and quality control mechanisms of the services it provides (...)”.

In summary, given its significance to the welfare of the population, health care is an area that should receive more attention from government agencies. Proper financial management of public funds as a whole is therefore necessary, assuming basic presuppositions such as the principles of legality, impersonality, morality, public transparency and efficiency as envisaged in Article 37 of the Federal Constitution of 1988.

The occurrence of active and passive waste of funds in public administration at the national and international levels has been documented in Hart, Shleifer and Vishny (1997), Di Tella and Schargrodsky (2003), Reinikka and Svensson (2005), Ferraz et al. (2008, 2012), Bandiera et al. (2009), Sodr e and Alves (2010) and Motta (2010). Data on such waste can also be found in the reports of the Office of the Comptroller General (Controladoria Geral da Uni o - CGU), which has conducted on-site inspections in Brazilian municipalities with up to 500,000 inhabitants since 2003. These inspections have indicated irregularities in several areas of public administration that receive federal funds, with those in the health sector being of special interest to this study.

As explained thus far, there are several problems in the application of funds in the health sector that could be solved or at least alleviated with good public governance, as advocated by Lewis (2006), who states that the literature dealing with governance and corruption ignores the field of social policy. This is a gap that must be filled to make it possible to use these funds efficiently because even properly conducted expenditures may in the end have no impact if priorities are not met because institutions are not working (LEWIS, 2006).

This brings us to the following research question: What factors of active and passive waste were associated with irregularities in the management of funds allocated by the Federal Government to municipalities for health-care in 2010?

<sup>1</sup> According to Matias-Pereira (2002, p. 3), corruption, which is called “active waste” for the purposes of this study, “occurs when the activity of the civil servant or politician is not based on the promotion of the general interest”, i.e., when a private entity obtains financial advantage at the expense of financial loss to the public entity.

<sup>2</sup> Inefficiency, which is called “passive waste” for the purposes of this study, occurs when public funds are negatively impacted but there is no financial benefit to a private entity in return.

This study aims to identify the active and passive waste factors that are most associated with irregularities in the management of municipal funds allocated by the Federal Government in the area of health care.

The primary issue to be addressed in the study is passive waste, which may be responsible for most of the unnecessary public expenditure, as already mentioned.

Thus, this study aims to contribute to the management and auditing of public funds in healthcare at three levels: awareness, prevention and restraint. Awareness refers to the awareness of the society in general regarding the existence of passive waste that affects the provision of public services, and that, similarly to active waste, has a negative impact on the use of public funds. Prevention is addressed in the sense that clearly

identifying the factors that negatively affect public health expenditure makes it possible to create a program that targets the qualifications of municipal managers and civil servants. Restraint can contribute to the monitoring of funds allocated to municipalities by the federal government for healthcare; by making it possible to identify active and passive waste factors, government auditors can create specific tests to address them.

This paper will be presented according to the following structure: the first section, the introduction, will contextualize and justify the problem and objective of the study; in the second section, a literature review will be presented; this will be followed by a description of the methodology used, empirical analysis, conclusions and, finally, a reference list, annex and appendix.

## 2 LITERATURE REVIEW

### 2.1 The Challenge of Resource Optimization.

In private entities, unnecessary expenditure in the production of a good or the provision of a service, i.e., waste, is related to an essential point on which the survival of a business depends: the issue of resource optimization. In environments in which there is fierce competition, organizations are required to do more with less to gain customers who constantly demand more, expecting high-quality products at a lower price.

An example of the need for resource management can be found in private healthcare, where studies have identified the professionalization of hospital management, which now adopts modern management tools similar to those that are commonly used in other businesses. That practice seeks to unite efforts to achieve excellence in service provision which, in turn, generates customer satisfaction and a consequent increase in income, as in the case of the implementation of the Balanced Scorecard in hospitals (Carvalho, Dias and Prochnik, 2005).

However, in regard to services and goods provided by the State, the issue of waste does not seem to receive as much attention, perhaps because the state faces no competition in the area of providing healthcare or because the "value" paid for the public service by the citizen is not directly related to the services that are consumed by him/her, the latter being a characteristic of government, according to Niyama and Silva (2011).

According to studies conducted by Oliveira (2002) and Reis, Slomski, Pereira and Mello (2007), public accounting is a subject little studied in Brazil; thus, it does not contribute as much as it might to improving the quality of information related to the disposition of public funds, which belong to all Brazilians. Thus, the evaluation of investments made by the state and the return brought by the programs the state develops, which have as their main goal the continuous improvement of quality of life, may be insufficiently or inefficiently evaluated.

### 2.2 Theoretical Structure of Active and Passive Waste according to Bandiera, Prat and Valletti (2009).

According to Bandiera et al. (2009), passive waste occurs when there is an unnecessary expense to the public entity but the civil servant or manager involved does not obtain financial advantage from it. Active waste, in turn, is corruption in which the individual obtains private benefit, causing a loss to public funds, for example when overinvoicing occurs in the contracting of a public service (Bandiera, Prat, & Valletti, 2009.)

To develop a theoretical framework for studying active waste and passive waste, Bandiera et al. (2009) used the example of the work of a purchasing manager of a public entity who must purchase a certain amount of a product for which the public entity can pay a certain price. In this case, two things may happen: the first is that the manager receives a direct benefit, a "kickback", when carrying out the transaction, which raises the price and hence increases public spending (active waste); the second is that the manager is inefficient and is unable to optimize the price (passive waste).

The underlying theoretical questions are, first, what leads to the occurrence or not of the first possibility and, second, what causes the efficiency or inefficiency of the manager in the second instance?

A plausible theoretical hypothesis related to efficiency in public spending is as follows: "The purchasing manager feels a pressure to keep prices low" (Bandiera et al., 2009, p. 1284). According to these authors, a manager's seeking to keep prices low may be due to a genuine motivation to maximize the use of public money because the manager is aware of the negative consequences of paying high prices when purchasing products and services. At the same time, inefficiency may occur due to low or inadequate knowledge on the part of the purchasing manager or even due to "laziness", according to Bandiera et al. (2009, p. 1284).

A plausible theoretical hypothesis related to active waste, which also applies with respect to managers who receive "kickbacks", is as follows: "The purchasing manager may also like private benefits" (Bandiera et al., 2009, p. 1284). However, the authors argue that the pursuit of private benefits is influenced by the risk of punishment. For example, in public entities operating in environments in which there is a culture of whistleblowing, the risk is higher than in environments in which the habit of denouncing managers does not exist (Bandiera et al., 2009, p. 1284).

Another aspect that may limit overinvoicing as a form of active waste is the way in which corporate governance is exercised within a governmental entity, to the extent that governance mechanisms can create restrictions or make rules less flexible regarding purchases, thus hindering increases in prices by managers (Bandiera et al., 2009, p. 1284).

In summary, in terms of the theoretical approach discussed above, procurement management within government entities can provide those responsible for purchases within government entities may aggregate more or less costs or incentives to deal with prices in procurement management within government entities.

### 2.3 Previous Studies.

The study developed by Bandiera et al. (2009), who are researchers at the London School of Economics and Imperial College London, calls attention to passive waste. These authors found empirically that of the total waste that occurred in the acquisition of goods by the government of Italy, passive waste, i.e., expenses generated by inefficiencies in public administration, accounted for 83% of unnecessary expenses.

Other studies that addressed this issue were conducted by Hart et al. (1997), Di Tella and Schargrotsky (2003), Reinikka and Svensson (2005), Ferraz, Finan and Moreira (2008, 2012), Sodr e and Alves (2010) and Motta (2010). It should be noted that according to Bandiera et al. (2009), the theory dealing with passive waste is newer and less developed than that dealing with active waste.

Hart et al. (1997, p. 1127 and 1131), researchers at Harvard University and the University of Chicago, raised the following question: What is the efficiency of the government in provision of public services? Such a question is valid when its answer, based on concrete data, is able to support the decision of a public manager to provide a specific service or outsource it to private institutions. To answer this question, the authors developed a mathematical model that was used to analyze the cost-benefit relationship of privatization. As primary research, they applied the model to the prisons of the United States of America (USA) and secondarily to other public services.

Hart et al. (1997, p. 1159) noted:

"Our theoretical arguments suggest that the case for in-house provision is generally stronger when non-con-

tractible cost reductions have large deleterious effects on quality, when quality innovations are unimportant and when corruption in government procurement is a severe problem. In contrast, the case for privatization is stronger when quality-reducing cost reductions can be controlled through contract or competition, when quality innovations are important and when patronage and powerful unions are a severe problem inside the government."

Hart et al. (1997) concluded that privatization is more appropriate than in-house provision, noting, however, that because of the high rate of violence, which makes it necessary to use force more often, privatization would not be appropriate in maximum security prisons. The application of the model to other sectors showed that the outsourcing of public services in the areas of foreign policy, police and the armed forces is not appropriate but that such outsourcing is appropriate for garbage collection services, weapons production and, to a reasonable extent, for schools. For healthcare, the authors report that a more detailed model would be required so that a more informed conclusion could be drawn.

Following the theme of waste of public funds but turning to healthcare, Di Tella and Schargrotsky (2003), of Harvard University and Torcuato Di Tella University (Universidad Torcuato Di Tella), conducted a study in which they found that there was a reduction of approximately 10% in the amounts paid in 1996 and 1997 for basic supplies by public hospitals in Buenos Aires, Argentina, due to suppression of corruption during this period through hospital audits. At the same time, the authors studied the relationship between the wages paid to employees who performed acquisitions in the hospitals and the occurrence of audits. They concluded that simply improving wages did not affect the efficiency of the service provided nor did a demonstrative policy of auditing solve the problem, considering the medium and long term. The authors found that both the implementation of the wage policy and an intensification of audits were required to produce an effect.

A study by Reinikka and Svensson (2005) of the World Bank and the Institute for International Economic Studies of Stockholm University sought to identify the most effective ways to increase enrollment and learning in primary schools. To that end, they conducted a study in Uganda in which they analyzed the government's strategy of publishing monthly data on the transfer of public funds to educational institutions in national newspapers, thereby facilitating public access to and understanding of information about capture of funds and bringing about greater public oversight. The government decided to increase transparency instead of increasing funds, reasoning that an increase in funds would not necessarily solve the problem because it has already been shown that in many poor countries legal institutions are among the most corrupt institutions. When the analysis was completed, the authors

found that not only had enrollment and academic performance improved, but capture of funds for schools had also increased, demonstrating that "(..) public access to information can indeed be a powerful deterrent to capture of resources at the local level" according to Reinikka and Svensson (2004, p. 4).

Using data from Brazil, Ferraz et al. (2008, 2012), researchers at the Catholic University of Rio de Janeiro (Pontifícia Universidade Católica do Rio de Janeiro), the University of California at Berkeley and Harvard University, studied the relationship between corruption (active waste) and mismanagement (passive waste) based on the results of the Prova Brasil [National system of elementary school assessment] in Portuguese and mathematics. They concluded that active and passive waste not only led to significant reductions in students' scores on these tests but that they also affected school indicators, reducing the approval rate and increasing the student dropout rate.

Sodré and Alves (2010), researchers from the Massachusetts Institute of Technology, the University of Brasília (Universidade de Brasília - UnB) and the CGU, reviewed the audit reports of the CGU public lottery seeking to verify the relationship between parliamentary amendments and signs of municipal corruption found in the reports. At the end of the study, the authors concluded that municipalities that obtained funds from such amendments have 25% more cases of corruption on average than municipalities that did not obtain such funds. The authors also drew attention to the inefficiency of municipal public management, noting that such inefficiency often occurs not only because of a lack of technical skill on the part of public managers or civil servants but also as a result of deliberate attempts to "disguise" corruption.

Another study conducted in Brazil by Motta (2010) at the State University of Campinas (Universidade Estadual de Campinas) analyzed the contribution of the public procurement system under the Direct Administration of the Executive Branch (Administração Direta do Poder Executivo) to creating more efficient expenditure, i.e., reducing passive waste. Motta (2010, p. ix) concluded that "the Brazilian system of procurement does not contribute substantially to improving the efficiency of federal public spending".

#### 2.4 Accounting, Governance and Combating Active and Passive Waste.

In its application in the public arena, accounting should not be regarded only as an obligation to be fulfilled or as an instrument for the recording of acts and events that occur within public administration. Instead, it should be regarded as a tool that can be used to objectively support the verification of actions performed by public managers and

to ensure that these actions show respect for the principles set forth in the Constitution, thus making it a governance mechanism that provides a basis for the investigation of how public money has been used.

Governance can be used as an instrument to fight corruption and inefficiency in the public sector to the extent that, according to Mimicopoulos, Kyj and Sormani (2007, p. iii), it "refers to the formal and informal arrangements that determine how public decisions are made and how public actions are carried out from the perspective of maintaining a country's constitutional values". In the area of public health, Lewis (2006) states that good governance leads to effectiveness and efficiency, generating economic growth, among other things. Thus, public governance meets the objective of combating waste of public funds and can provide a form of control of those in power (Matias-Pereira, 2005).

The audits conducted by the CGU in the Brazilian municipalities constitute governance mechanisms that are responsible for verifying the proper implementation of previously established public programs and the proper management of expenditures related to these programs. Moreover, the municipal health councils also act as governance mechanisms because the citizens' participation in the preparation of guidelines for health policy, which includes monitoring health actions and supervising the use of funds in this area, is guaranteed through them. If both governance mechanisms work effectively, they can achieve lower levels of waste of public funds because they increase the risk of discovery of public managers' irregular acts and increase the likelihood of punishment for these actions.

The work of the auditor and governance are complementary in overseeing the performance of the public manager and directing him/her towards meeting the needs of the population. This relevance is expressed in CFC [Conselho Federal de Contabilidade (Federal Accounting Council)] Resolution No. 1,209/09, which concerns the auditor's communication with those responsible for governance. From the perspective of this resolution, following the principles of good governance, the auditors (for the purposes of this study, the auditors are understood to be CGU auditors) should regularly participate in the meetings of the municipal council, which is defined in this study as a type of audit committee of the public sector. In addition, the president of the municipal council should have regular meetings with the auditors, and the city council should meet with the auditor without management present at least once a year (CFC Resolution No. 1,209/09). Given its relevance, communication between the CGU auditors and those responsible for governance in the municipalities, as recommended in CFC Resolution no. 1,209/09, is an object that should be investigated empirically.

### 3 METHODOLOGICAL PROCEDURES

To achieve the general objective of this paper, a literature search was initially performed to determine what points are being discussed nationally and internationally on the subject

and to serve as the basis for the classification of variables. Then, the Reports of the Auditors of the CGU Auditing Program by Public Lotteries (Programa de Fiscalização por Sor-

teios Públicos) were used for the identification of active and passive waste in municipal public health expenditures.

The reports prepared by the CGU were chosen because they were intended to analyze the application of federal funds in the municipalities through on-site visits that included physical and documentary inspections, interviews, application of questionnaires and photographic records, among others. The Government programs were the subject of supervisory actions performed by the Supervisor Ministry (i.e., it is possible to identify the specific analysis related to the municipality's health expenditures), specifying the number of inspections carried out and the funds applied.

It should be noted that, despite the fact that the CGU reports represent a source of technical (not scientific) data,

they have been used in scientific studies to build research databases that address corruption and/or inefficiency. These databases include those of Sodré and Alves (2010), Peixoto, Rocha, Nishijima and Pstali (2012), Avelino, Barberia and Biderman (2013) as well as the studies developed by Ferraz and Finan (2007, 2011) and Ferraz et al. (2008, 2012).

The initial sample comprised 120 Brazilian municipalities audited in the 31st and 32nd CGU lotteries, which occurred in 2010. Municipalities that did not receive funding from the Ministry of Health were excluded, resulting in a final sample of 102 municipalities.

The variables classifying active and passive waste used in this study are the same as those used by Ferraz et al. (2008) based on Ferraz and Finan (2007)<sup>3</sup> and are presented below.

**Table 1** Classification of active and passive waste

ACTIVE WASTE			
Nº	Acronym	Variable	Description
1	OI	Overinvoicing	Occurs when the prices paid are above the market price or when the amount purchased far exceeds the needs of the municipality.
2	BDF	Bidding with diversion of funds	Occurs when there is evidence that the service bid and paid for has not been provided.
3	DF	Diversion of funds	Occurs in cases in which there is expenditure without proof that the physical part or service was provided.
PASSIVE WASTE			
Nº	Acronym	Variable	Description
1	NPT	Non-payment of taxes	Occurs when the city hall fails to pay taxes.
2	NUF	Non-use of funds	Occurs when the Federal Government allocates money but the municipality does not use it.
3	UW	Unfinished work	Occurs when the mayor leaves work unfinished and pays for the corresponding portion.
4	LPPC	Lack of or poor performance of the council	Occurs when the health council does not supervise spending in the area.
5	Client	Clientelism	Occurs when the mayor spends public funds with the explicit purpose of getting votes.
6	IISP	Irregular implementation of social programs	Occurs when the control or registration of social programs is irregular.
7	WE	White elephant	Occurs when there is construction or purchase of property disproportionate to the needs of the municipality.
8	IB	Irregular bidding	Occurs when there is an irregularity in the bidding documents.
9	FB	Fractional bidding	Occurs when the mayor splits expenditures to be made across different bids so as to change the type of bid required according to regulations provided for by law.
10	LCB	Lack of competitive bidding	Occurs when bidding has not been performed with a minimum of three competitors.
11	NB	Nepotistic bidding	Occurs when the mayor uses relatives or third parties in the bidding process for his/her own benefit.
12	CPSS	Change of purpose for the same sector	Occurs when the fund is used in the health sector but for a different purpose than that originally agreed upon with the Federal Government.
13	CPAS	Change of purpose to another sector	Occurs when the fund is used in another sector for a different purpose than that originally agreed upon with the Federal Government.
14	NMF	Non-occurrence of matching funds	Occurs when the municipality does not provide a matching funds contribution.
15	WFI	Work finished irregularly	Occurs when the work is performed in its entirety but with some minor irregularities.
16	INRM	Irregularity not related to the mayor	Occurs when there are irregularities that are not the responsibility of the mayor.
17	MM	Mismanagement	Includes any other irregularity noted by the CGU that does not fit any of the other above criteria.

Source: Compiled from variables of Ferraz et al. (2008, p. 13).

To prepare the database, a matrix was created in Excel in which each row contained one of the municipalities in the sample and each column contained one of the waste variables described above. A reading was performed of the CGU audit reports for each of the audited municipalities, and every irregularity found regarding a specific municipality was classified in the corresponding column. At the

end, the total number of irregularities found for each of the active and passive waste variables was totaled for each municipality, thereby creating a database with the findings of irregularities (or "points"<sup>4</sup>) in healthcare in each municipality in the sample. Appendix 1 lists some examples of information classification based on the variables in the CGU report.

<sup>3</sup> For more details about the construction of these variables, please see Ferraz et al. (2008) and Ferraz and Finan (2011).

<sup>4</sup> The term "point" is used in the audit to refer to irregularities found by carrying out the work.

Subsequently, empirical analysis was performed by applying multivariate factor analysis (FA) to determine which active and passive waste factors were associated with irregularities in the management of funds allocated by the Federal Government to municipalities for healthcare in 2010. FA is a multivariate statistical technique that seeks to identify a relatively small number of common factors that can be used to represent relationships between a large number of correlated variables (Fávero, Belfiore, Silva & Chan, 2009).

For FA to be applied, the data must follow a multivariate normal distribution. However, Hair, Anderson, Tatham and Black (2009) argue that although univariate normality does not guarantee multivariate normality, if all variables meet this condition, any deviations from multivariate normality are usually innocuous. To meet this assumption, the Box-Cox transformation was applied to the data for the following variables: i) active waste: bidding with diversion of funds (BDF) and diversion of funds (DF); ii) passive waste: irregular bidding (IB), change of purpose for the same sector (CPSS), non-occurrence of matching funds (NMF) and mismanagement (MM).

#### 4 EMPIRICAL ANALYSIS

To meet the assumptions of the factor analysis, the normality of the data was first verified; Box-Cox transformations were then applied to the variables that did not have normal distributions. After transformation, it was possible

to verify that all variables related to active and passive waste followed a normal distribution ( $p > 0.05$ ) at a significance level of 5% (Table 2).

After assessing the normality of the data, the following procedures were followed, in line with Fávero, Belfiore, Silva and Chan (2009) and Field (2009): i) analysis of the correlation matrix, which should reveal a substantial number of significant correlations ( $p < 0.05$ ); ii) Kaiser-Meyer-Olkin (KMO) statistical analysis (the closer a value is to 1, the more appropriate the use of this technique); iii) Bartlett's test of sphericity, which evaluates the hypothesis that the correlation matrix may be the identity matrix' and iv) analysis of the measure of sampling adequacy (MSA) (the value of this measure should be greater than 0.50).

The method used to obtain the factors was principal component analysis (PCA), which was used to summarize most of the data variance into a minimum number of factors. The Kaiser criterion, which considers all factors with eigenvalues less than 1 to be insignificant, indicating that they should be discarded, was used to determine the number of factors to extract. Once extracted, the factors were rotated by the Varimax method of orthogonal rotation.

To perform the factor analysis, IBM SPSS Statistical software version 20 was used.

**Table 2** Descriptive measures and Kolmogorov-Smirnov (KS) normality test for active and passive waste data relating to irregularities in the management of funds allocated by the Federal Government to municipalities for healthcare in 2010

Type	Waste	Mean	Standard deviation	Minimum	Median	Maximum	KS	p
Active	OI	0.42	0.76	0.00	0.00	3.00	0.07	>0.15
	BDF	0.67	1.18	0.00	0.00	6.00	0.08	>0.09
	DF	1.90	1.95	0.00	1.00	10.00	0.05	>0.150
Passive	NPT	0.09	0.45	0.00	0.00	4.00	0.06	>0.15
	NUF	0.05	0.26	0.00	0.00	2.00	0.05	>0.15
	UW	0.21	0.59	0.00	0.00	4.00	0.07	>0.15
	LPPC	0.46	0.56	0.00	0.00	3.00	0.08	>0.15
	Client	0.01	0.10	0.00	0.00	1.00	0.05	>0.15
	IISP	0.64	0.95	0.00	0.00	4.00	0.09	0.09
	WE	0.05	0.22	0.00	0.00	1.00	0.07	>0.15
	IB	1.78	2.29	0.00	1.00	12.00	0.05	>0.15
	FB	0.13	0.39	0.00	0.00	2.00	0.08	>0.15
	LCB	0.18	0.43	0.00	0.00	2.00	0.09	>0.15
	NB	0.02	0.14	0.00	0.00	1.00	0.05	>0.15
	CPSS	1.06	1.23	0.00	1.00	4.00	0.08	>0.15
	CPAS	0.20	0.60	0.00	0.00	4.00	0.06	>0.15
	NMF	0.85	1.10	0.00	1.00	6.00	0.08	>0.15
	WFI	0.13	0.44	0.00	0.00	3.00	0.08	>0.15
INRM	0.02	0.14	0.00	0.00	1.00	0.06	>0.15	
MM	9.73	5.62	1.00	8.00	30.00	0.06	>0.15	

Legend: OI: Overinvoicing; BDF: Bidding with diversion of funds; DF: Diversion of funds; NPT: Non-payment of taxes; NUF: Non-use of funds; UW: Unfinished work; LPPC: Lack of or poor performance of the council; Client: Clientelism; IISP: Irregular implementation of social programs; WE: White Elephant; IB: Irregular bidding; FB: Fractional bidding; LCB: Lack of competitive bidding; NB: Nepotistic bidding; CPSS: Change of purpose for the same sector; CPAS: Change of purpose to another sector; NMF: Non-occurrence of matching funds; WFI: Work finished irregularly; INRM: Irregularity not related to the mayor; MM: Mismanagement.

Subsequently, the correlation matrix of active waste data was examined, revealing that of the three pairs of variables, only one showed a correlation (Table 3).

**Table 3** Correlation matrix for active waste data

	OI	BDF
BDF	0.09	
DF	0.10	0.32*

\*significant ( $p < 0.05$ ).

Regarding passive waste, it was found that the variables IISP, Client, LCB, NB, CPAS, NUF, UW, CPSS, WE and WFI did not exhibit a considerable number of

significant correlations with the other variables; therefore, these variables were removed from the factor analysis (Field, 2009).

Table 4 shows the correlation matrix for the variables that remained in the analysis. Significant correlations were found between NPT and NMF and between NPT and MM. LPPC showed significant correlations with FB, NMF, INRM and MM, and IB was significantly correlated with FB, INRM and MM. FB waste showed significant correlations with LPPC and NMF waste. NMF waste presented significant correlations with NPT, LPPC, FB and MM waste. INRM waste correlated significantly with LPPC and IB waste. In general, MM waste correlated with all other types of waste except FB and INPR.

**Table 4** Correlation matrix for passive waste data relating to irregularities in the management of funds allocated by the Federal Government to municipalities for healthcare in 2010

	NPT	LPPC	IB	FB	NMF	INRM
LPPC	0.07					
IB	0.10	0.07				
FB	0.05	0.27*	0.15			
NMF	0.22*	0.19*	0.03	0.19*		
INRM	0.13	0.39*	0.24*	0.14	0.08	
MM	0.29*	0.21*	0.27*	0.11	0.30*	0.14

\*significant ( $p < 0.05$ ).

The values of the KMO statistic for active (0.54) and passive (0.61) waste indicate the adequacy of the sampling for factor analysis. However, the significance level of Bartlett's test of sphericity for active waste ( $p = 0.102$ ) indicates that the correlation matrix is equal to the identity matrix. This, in turn, indicates that there are relationships between the active waste variables; factor analysis is therefore not appropriate for these data. For the passive waste variables, Bartlett's test is highly significant ( $p < 0.001$ ); therefore, factor analysis is appropriate (Table 5).

**Table 5** Kaiser-Meyer-Olkin (KMO) test for active and passive waste data relating to irregularities in the management of the funds allocated by the Federal Government to municipalities for healthcare in 2010

Waste	Measure		Value
Active	KMO		0.54
	Bartlett's test of sphericity	$\chi^2$	6.20
		$p$	0.102
Passive	KMO		0.61
	Bartlett's test of sphericity	$\chi^2$	68.65
		$p$	<0.001

Factors were retained by the Kaiser criterion. Because the factor solution extracts the factors in order of importance, Factor 1 explains the largest portion (21.78%) of the variance; Factor 2 explains 21.72%, and Factor 3 explains

17.29%. Thus, 60.79% of the total variance in the factor matrix is represented by information contained in three factors (Table 6).

The choice of which waste elements should comprise each factor was made taking into account the factor loadings of each type of waste from left to right along each row and selecting factor loadings with values greater than 0.50 for purposes of interpretation (Field, 2009). By adopting this process, Factor 1 has three significant loadings, Factor 2 has two, and Factor 3 also has two significant loadings (Table 6).

Factor 1 groups the variables "non-payment of taxes", "non-occurrence of matching funds" and "mismanagement" and is called "Administrative Inadequacy". These variables were grouped together because they all represent negligence in the management of healthcare; that is, the money was available for use but the city hall failed to pay taxes, to apply a matching fund or to meet the necessary factors for good management.

Factor 2 includes the variables "lack of or poor performance of the council" and "fractional bidding" and is called "Weak Supervision". With lack of or poor performance of the Municipal Health Council, the chance of irregularities related to management increases, for example because monitoring of acquisitions is not performed, which may result in the same acquisitions being carried out in fractional form throughout the year.

Factor 3 includes the variables "irregular bidding" and



“irregularity not related to the mayor” and is called “Low Level of Compliance”<sup>5</sup> because in the case of both variables irregularities refer to non-compliance with the laws and regulations that support the operation and processes of public administration.

The highest commonality values were obtained for the variables IB (0.72), NMF (0.67) and LPPC (0.67), indicating that these variables are important in explaining the total variability of the data.

**Table 6** Matrix of factor loadings derived using the Varimax method of orthogonal rotation for passive waste data relating to irregularities in the management of funds allocated by the Federal Government to municipalities for healthcare in 2010

Waste	Factor			Commonality	MSA
	1	2	3		
NPT	0.72	-0.06	0.12	0.53	0.67
MM	0.71	0.10	0.31	0.61	0.63
NMF	0.68	0.34	-0.30	0.67	0.66
IB	0.18	0.01	0.83	0.72	0.53
FB	0.10	0.66	-0.04	0.45	0.65
LPPC	0.06	0.81	0.11	0.67	0.58
INRM	-0.02	0.55	0.55	0.60	0.58
Eigenvalue	1.52	1.52	1.21		
Variance (%)	21.78	21.72	17.29		
Cumulative variance (%)	21.78	43.50	60.79		

## 5 CONCLUSIONS

The objective of this study was to identify the active and passive waste factors that are most associated with irregularities in the management of municipal funds allocated by the Federal Government of Brazil for healthcare.

To achieve this objective, a theoretical and empirical study was conducted. In the first part of the study, the theoretical basis for the study was identified. In the empirical part, given the objective of the research, the multivariate technique of factor analysis was used.

The study results show that for active waste it is not possible, based on the data analyzed, to present a single most defining factor because the result of Bartlett's test was not significant. A likely cause of this outcome is the fact that only three variables were related to active waste. For passive waste, three factors were found that were most associated with irregularities. Factor 1 was called “Administrative Inadequacy” and grouped the variables “non-payment of taxes”, “non-occurrence of matching funds” and “mismanagement”. This factor confirms the findings of Bandiera et al. (2009), who found that there are inefficient public managers and managers who fail to optimize resources and that this can occur due to lack of the knowledge needed to perform the function or through being “lazy”. One practical consequence of this problem occurs when the federal government fails to allocate funds relating to a program to be developed in a municipality because the latter has not provided the necessary matching funds, which sometimes represent a very small percentage of the total value of the program. It is noteworthy that there are cases in which the municipality has the resources available and still does not

provide the matching funds that have been agreed upon beforehand.

Factor 2 included the variables “lack or poor performance of the council” and “fractional bidding” and is called “Weak Supervision”. A point to be clarified is that the Municipal Health Council is critical to the efficient provision of public healthcare due to its role in the formulation of strategies and in the control of policy implementation and economic and financial supervision of the area, which, among other benefits, inhibits the occurrence of fractional bidding. This factor, Weak Supervision, can lead to the occurrence of active waste, as noted in the literature by Bandiera et al. (2009), because civil servants and managers who have a tendency to seek private benefits do so proportionally to the risk of punishment. According to a study by Di Tella and Schargrodsky (2003), addressing this factor through the effective action of the council could reduce passive waste.

Finally, Factor 3, “Low Level of Compliance”, encompasses the variables “irregular bidding” and “irregularity not related to the mayor.” This factor relates to non-compliance to previously established rules, standards and guidelines that could be avoided by the implementation of appropriate governance mechanisms, thus placing civil servants and managers under pressure to be efficient, as proposed by Bandiera et al. (2009).

The most important contribution of this study is that it reveals the need to draw the attention of academia, government and society in general to the existence of passive waste that currently affects the quality of services provided to the population, has a negative impact on public

<sup>5</sup> Compliance refers to the level of compliance of something with previously established laws, regulations, policies and guidelines.

funds and may consume up to 4 times more of the allocated resources than active waste, such as in the Italian case identified by Bandiera et al. (2009). Furthermore, passive waste can be used to conceal active waste, as noted by Sodr e and Alves (2010). As a practical consequence of this study, theoretical and empirical arguments have been identified that suggest that passive waste can be reduced through a series of actions such as (i) increased supervision, (ii) greater transparency of information related to government programs (functioning and execution) so as to make public sector information effectively accessible and understandable to citizens, (iii) implementation of training and motivation programs for civil servants and public managers, thus helping them internalize the importance of proper professional practice and seeking to create a culture of whistleblowing regarding irregularities practiced in public service, (iv) conducting an analysis to determine whether a service should be provided by the government itself or be outsourced and (v) implementa-

tion of new governance mechanisms and strengthening of existing mechanisms such as the CGU audit, which could reduce both active and passive waste.

It should be stressed that although the CGU audit reports present findings that can be questioned by mayors, the fact that there is a "point" in the report is already evidence of the occurrence of certain types of waste. This is true because the report is supported by documents or lack of documents justifying specific actions performed by civil servants and municipal managers. However, this can also be considered a limitation of the study.

The following are suggested as points for future research: (i) expanding the study to include the use of a larger healthcare database (the 2010 CGU audit reports were used in this study, referring to lotteries 31 and 32); (ii) increasing the number of variables used to identify active waste; and (iii) expanding the research to other areas of municipal governance that receive federal funds, such as education.

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## ANNEX

## Municipalities that received special CGU auditing through the Lottery Program of Municipalities

## PUBLIC LOTTERY OF MUNICIPALITIES

31 <sup>st</sup>			32 <sup>nd</sup>		
Draw order	Municipality	FU	Draw order	Municipality	FU
1 <sup>st</sup>	Mauá da Serra	PR	1 <sup>st</sup>	Normandia	RR
2 <sup>nd</sup>	Wenceslau Braz	PR	2 <sup>nd</sup>	Douradina	MS
3 <sup>rd</sup>	Guaporema	PR	3 <sup>rd</sup>	São Félix do Araguaia	MT
4 <sup>th</sup>	São Gabriel	BA	4 <sup>th</sup>	Xambioá	TO
5 <sup>th</sup>	Itaparica	BA	5 <sup>th</sup>	Nossa Senhora das Dores	SE
6 <sup>th</sup>	Palmas de Monte Alto	BA	6 <sup>th</sup>	Cerejeiras	RO
7 <sup>th</sup>	Pojuca	BA	7 <sup>th</sup>	Cardoso Moreira	RJ
8 <sup>th</sup>	Cachoeira	BA	8 <sup>th</sup>	Anajás	PA
9 <sup>th</sup>	Arroio do Meio	RS	9 <sup>th</sup>	Santa Filomena	PE
10 <sup>th</sup>	Doutor Ricardo	RS	10 <sup>th</sup>	Pedro Velho	RN
11 <sup>th</sup>	Pouso Novo	RS	11 <sup>th</sup>	Umirim	CE
12 <sup>th</sup>	Pedro Osório	RS	12 <sup>th</sup>	Luziânia	GO
13 <sup>th</sup>	Jeriquara	SP	13 <sup>th</sup>	Senador La Rocque	MA
14 <sup>th</sup>	Ipuã	SP	14 <sup>th</sup>	Imaculada	PB
15 <sup>th</sup>	Viradouro	SP	15 <sup>th</sup>	São João da Serra	PI
16 <sup>th</sup>	Dracena	SP	16 <sup>th</sup>	Peritiba	SC
17 <sup>th</sup>	Poloni	SP	17 <sup>th</sup>	Doutor Pedrinho	SC
18 <sup>th</sup>	Coronel Xavier Chaves	MG	18 <sup>th</sup>	Santo Inácio	PR
19 <sup>th</sup>	Capim Branco	MG	19 <sup>th</sup>	Inajá	PR
20 <sup>th</sup>	São João da Lagoa	MG	20 <sup>th</sup>	Heliópolis	BA
21 <sup>st</sup>	Carvalhos	MG	21 <sup>st</sup>	Iuiú	BA
22 <sup>nd</sup>	Santo Antônio do Monte	MG	22 <sup>nd</sup>	Erval Seco	RS
23 <sup>rd</sup>	Matias Barbosa	MG	23 <sup>rd</sup>	Caseiros	RS
24 <sup>th</sup>	Frei Inocência	MG	24 <sup>th</sup>	Votorantim	SP
25 <sup>th</sup>	Amajari	RR	25 <sup>th</sup>	Ribeirão Branco	SP
26 <sup>th</sup>	Primavera de Rondônia	RO	26 <sup>th</sup>	Bariri	SP
27 <sup>th</sup>	Tefé	AM	27 <sup>th</sup>	Planura	MG
28 <sup>th</sup>	Frei Paulo	SE	28 <sup>th</sup>	Caxambu	MG
29 <sup>th</sup>	Venda Nova do Imigrante	ES	29 <sup>th</sup>	Senador Cortes	MG

continuous

continued

31 <sup>st</sup>			32 <sup>nd</sup>		
Draw order	Municipality	FU	Draw order	Municipality	FU
30 <sup>th</sup>	Bonito	MS	30 <sup>th</sup>	Campestre	MG
31 <sup>st</sup>	Taquarana	AL	31 <sup>st</sup>	Pedra Branca do Amapari	AP
32 <sup>nd</sup>	Girau do Ponciano	AL	32 <sup>nd</sup>	Maracaju	MS
33 <sup>rd</sup>	Cabo Frio	RJ	33 <sup>rd</sup>	Tabatinga	AM
34 <sup>th</sup>	Inhangapi	PA	34 <sup>th</sup>	Curralinho	PA
35 <sup>th</sup>	São Sebastião da Boa Vista	PA	35 <sup>th</sup>	Nova Maringá	MT
36 <sup>th</sup>	Itaituba	PA	36 <sup>th</sup>	São Bento do Tocantins	TO
37 <sup>th</sup>	Santa Rosa do Tocantins	TO	37 <sup>th</sup>	Pedro Canário	ES
38 <sup>th</sup>	Cocalinho	MT	38 <sup>th</sup>	Pendências	RN
39 <sup>th</sup>	Jardim do Seridó	RN	39 <sup>th</sup>	Branquinha	AL
40 <sup>th</sup>	Luís Gomes	RN	40 <sup>th</sup>	Independência	CE
41 <sup>st</sup>	Lucrécia	RN	41 <sup>st</sup>	Surubim	PE
42 <sup>nd</sup>	Timbaúba	PE	42 <sup>nd</sup>	Penalva	MA
43 <sup>rd</sup>	Lagoa do Carro	PE	43 <sup>rd</sup>	Alegrete do Piauí	PI
44 <sup>th</sup>	Camutanga	PE	44 <sup>th</sup>	Riacho dos Cavalos	PB
45 <sup>th</sup>	Granja	CE	45 <sup>th</sup>	Americano do Brasil	GO
46 <sup>th</sup>	Jucás	CE	46 <sup>th</sup>	Capinzal	SC
47 <sup>th</sup>	Mucambo	CE	47 <sup>th</sup>	Bom Jardim da Serra	SC
48 <sup>th</sup>	Arari	MA	48 <sup>th</sup>	Congonhinhas	PR
49 <sup>th</sup>	Água Doce do Maranhão	MA	49 <sup>th</sup>	Pinhalão	PR
50 <sup>th</sup>	Mata Roma	MA	50 <sup>th</sup>	Uibaí	BA
51 <sup>st</sup>	Paes Landim	PI	51 <sup>st</sup>	Arataca	BA
52 <sup>nd</sup>	Dom Expedito Lopes	PI	52 <sup>nd</sup>	Toropi	RS
53 <sup>rd</sup>	Flores do Piauí	PI	53 <sup>rd</sup>	Alto Alegre	RS
54 <sup>th</sup>	Passagem	PB	54 <sup>th</sup>	Pedregulho	SP
55 <sup>th</sup>	Natuba	PB	55 <sup>th</sup>	Vargem	SP
56 <sup>th</sup>	Caldas Brandão	PB	56 <sup>th</sup>	São João de Itacema	SP
57 <sup>th</sup>	Carmo do Rio Verde	GO	57 <sup>th</sup>	São Sebastião do Rio Verde	MG
58 <sup>th</sup>	Novo Gama	GO	58 <sup>th</sup>	Abadia dos Dourados	MG
59 <sup>th</sup>	Piratuba	SC	59 <sup>th</sup>	Felisburgo	MG
60 <sup>th</sup>	Caçador	SC	60 <sup>th</sup>	Itamogi	MG

## APPENDIX 1

To facilitate understanding of how the database was constructed, the following are provided as examples of data extracted from the reports of the Auditors of the CGU Auditing Program by Public Lotteries and classified according to the active and passive waste variables shown in Table 1.

Overinvoicing: "Basic medicines purchased at higher prices than the market price."

Bidding with diversion of funds: "Under-execution of the object compared to costs incurred, with a loss of at least R \$ 24,026.67."

Lack of or poor performance of the council: "Lack of minimum conditions for the functioning of the Municipal Health Council of Bom Jardim da Serra, state of Santa Catarina-SC, no confirmation of the transmission of informa-

tion to the Council and low frequency of their meetings."

Lack of competitive bidding: "Company selected by invitation without [the bidding process] meeting the requirement of a minimum of three valid tenders."

Non-occurrence of matching funds: "Non-achievement by the State and the Municipality of the amounts agreed for Basic Pharmacy drug distribution to the population of the municipality."

Non-payment of taxes: "No proof of payment of social security contributions."

Unfinished work: "Stalled and unfinished works relating to Agreement No. EP 1445/2005 due to their abandonment by the contractor, thus preventing the full attainment of the objectives pursued and harming the constitutional principles of efficiency and economy."