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FUNDACIÓN DE LAS CAJAS DE AHORROS
DOCUMENTO DE TRABAJO
Nº 488/2009

De conformidad con la base quinta de la convocatoria del Programa de Estímulo a la Investigación, este trabajo ha sido sometido a evaluación externa anónima de especialistas cualificados a fin de contrastar su nivel técnico.

ISSN: 1988-8767

La serie **DOCUMENTOS DE TRABAJO** incluye avances y resultados de investigaciones dentro de los programas de la Fundación de las Cajas de Ahorros.
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MEASURING EFFICIENCY IN PRIMARY HEALTH CARE: THE EFFECT OF EXOGENOUS VARIABLES ON RESULTS

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Abstract

The aim of this paper is to extend the existing literature about efficiency measurement in primary health care with the application of a recently developed method to deal with exogenous variables. In this context, these variables are represented by the main characteristics of the covered population. The use of this technique allows calculating more accurate efficiency scores that can reflect the performance of units more properly. Our results show that the inclusion of these variables in the evaluation has a great impact on both the values of efficiency scores and the rank of units. This analysis has been carried out using a great amount of data available about primary health care centers in the Spanish region of Extremadura.

Keywords: Efficiency, DEA, Primary Health Care, Exogenous Variables.

JEL Classification: I12, C14

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Acknowledgments: The authors are most grateful to the Consejeria de Sanidad y Dependencia of the Junta de Extremadura for its financial and data availability support. We also thank Carmelo Petraglia for his helpful assistance in preparing the dataset used in the research.

1. INTRODUCTION

In the last two decades the efficiency analysis of health care organizations has become very popular among researchers in this field (Hollingsworth and Street, 2006). Most of empirical studies use frontier efficiency measurement techniques to construct indicators that reflect the performance of health care providers (Worthington, 2004). This approach use a production possibility frontier formed by technically efficient output combinations that a producer can achieve. In the case that an organization fails to achieve that level and is placed beneath the frontier, it is said to be inefficient. Thus, if a production frontier can be determined, the performance of a unit can be evaluated by comparing its behaviour with the idealized benchmark of economic efficiency.

In most of cases, the construction of a production frontier and the subsequent calculation of efficiency scores for each organization are based on information about output measures and inputs used in the process, represented mainly by labour force. Nevertheless, it is worth noting that the performance of these organizations also depends on other factors that are beyond the managers´ control, which can have a great influence on the process. Thus, it seems reasonable that those exogenous factors should be taken into account when the performance of those producers is assessed so that the efficiency scores can properly reflect the part of the production process for which the units are responsible.

To the best of our knowledge, there are few empirical studies that have addressed this problem previously in the literature (Chilingerian, 1995; Rosko, 1999; Kontodimopoulos *et al*, 2007). Moreover, they consider the effect of these variables in a two-stage analysis so that they can test their potential influence on efficiency *a posteriori*, but none of them has considered that information in order to calculate corrected efficiency scores.

In this study, this issue is analyzed both from a theoretical and empirical viewpoint, with the aim of including the effect of those variables on efficiency

measurement. For this purpose, after discussing different options that can be used for including this information in this type of analysis, we apply a recently developed methodology to deal with those variables that can be easily adapted to the specific characteristics of the health care provision services. Our results show that the inclusion of these factors in the evaluation changes dramatically the conclusions obtained about the performance of primary health care providers.

The analysis has been carried out thanks to the richness of information retrieved from a newly constructed database for the primary health care providers of a Spanish region (APEX06). In addition of providing information about output and input measures, this dataset offers a great amount of information about the socio-demographic characteristics of the population using health care services, which can be considered as exogenous factors in this context.

The article is organized as follows. Section II provides a brief summary of some important issues concerning the measurement of efficiency in primary health care. Section III introduces DEA methodology and describes the approach used to include non-discretionary inputs in the estimation of efficiency scores. Section IV presents the main characteristics of dataset and the variables used in the empirical application. In Section V the main results are reported and analyzed according to different criteria. The last section concludes.

2. PRIMARY HEALTH CARE PROVISON

Since the publication of a seminal study referred to nursing services in 1983 (Nunamaker, 1983); there has been a numerous and wide ranging collection of papers devoted to the measurement of technical efficiency in health care with most of them focused on hospitals (Sherman, 1984; Ozcan, 1992; Hollingsworth and Parkin, 1995; McCue and Ozcan, 1996; Harrison *et al*, 2004) with primary health care services receiving far less attention (Huang and McLaughlin, 1989; Salinas and Smith, 1996; García-Marcuello *et al*, 1999).

A potential explanation for less attention can be that while a hospital is an organization with clear boundaries, where patients are admitted and discharged, primary health care delivery can be thought of as an open community-based system with unclear boundaries. This introduces greater complexity when it comes to the economic modelling of the sector and the specification of relevant outputs and inputs (Amado and Dyson, 2008).

With respect to the appropriate definition of primary care providers' output, it is assumed that it should capture the impact of the services on the current and future health status of patients. Unfortunately, the lack of adequate information on this aspect means that observation of the causality connection between the provision of health services and the health status of the population served is far from straightforward. This has lead researchers to the adoption of the so-called "activity oriented" models where the primary care output is proxied by activity levels of the health care units under analysis, i.e., by the number of registered visits or consultations. Examples of this approach can be found in Pina and Torres (1992), Chilingerian and Sherman (1996, 1997), Ozcan (1998) and Goñi (1999).

Regarding the inputs of the process, the difficulty in defining input costs may account for the emphasis of health care efficiency studies on measuring technical efficiency alone (Worthington, 2004). Most studies focus on the use of two types of inputs: labour (number of medical or non-medical staff) and capital (often proxied by the area of the centre). However, there are other external factors that can have influence on the level of efficiency of an organization and, therefore, they should be taken into account to provide an accurate measure of efficiency[1].

Among these variables, we should distinguish between non-discretionary inputs and environmental variables. The former ones are inputs that take part in the production process but are exogenously fixed, i.e., the organizations cannot

[1] Organizational factors determined internally in the primary care centres can also affect their efficiency (Schmacker and McKay, 2008).

modify their values, so these factors should be included in the calculation of efficiency scores, although they have to be treated in a different way. In contrast, the environmental factors do not participate in the process but they can have an effect on it. These variables usually divide the sample in several subsamples with similar characteristics. For example, in the context of primary health care services the situation of a centre (urban or rural) or the existence (or not) of minor surgery services can be considered as environmental variables.

In our analysis, we consider that the socio-economic characteristics of the population using health services must be considered as non-discretionary inputs within the process, since their demands of services have a clear influence on the final outcome of the process. Therefore, the information related to these users must be explicitly included in the calculation of efficiency scores.

3. METHODOLOGY

In the context of measuring efficiency in primary health care, Data Envelopment Analysis (DEA) has been used increasingly in the last twenty years[2]. This choice is based on several reasons such as the simplicity of the assumptions underlying the method, the provision of information about a peer or a combination of peers for comparison, the ability to perform in the absence of price information (Morita, 2003) and its applicability to the multiple input–output nature of health care provision[3].

DEA methodology was introduced in 1978 (Charnes *et al*, 1978)]. This non-parametric technique yields estimates of the comparative technical efficiency of a set of Decision Making Units (DMUs). The efficiency of each DMU depends on its ability to improve its results or reduce the consumption of resources while being restricted relatively to the production of the other DMUs.

[2] See Hollingsworth *et al* (1999) for a literature review about efficiency measurement in health care using DEA. An extended review that also includes parametric methods can be found in Amado and Dyson (2008).
[3] DEA is considered preferable to any other approaches when the aim of the study is to measure the efficiency of a group of units producing several outputs (Seiford and Thrall, 1990).

The standard formulation of the program can take several forms according to different criteria, so it can be oriented to minimize input values or maximize output values and can also be presented as a fractional linear or dual programme[4]. In this paper, we adopt an input-oriented program which can be represented by the following expression:

$$\text{Min} \quad \theta_0 - \varepsilon\left(\sum_{r=1}^{s} s_r^+ + \sum_{i=1}^{m} s_i^-\right)$$

$$\text{Subject to} \quad \sum_{j=1}^{n} \lambda_j x_{ij} + s_i^- = \theta_0 x_{ij0} \qquad i = 1,\ldots..,\ m$$

$$\sum_{j=1}^{n} \lambda_j y_{rj} - s_r^+ = y_{rj0} \qquad r = 1,\ \ldots..,\ s$$

$$\lambda_j \geq 0;\ s_r^+ \geq 0;\ s_i^- \geq 0 \qquad j = 1,\ \ldots..,\ n \qquad (1)$$

where x_{ij} is the vector of inputs and y_{rj} the vector of outputs for DMU *j;* θ_0 is the efficiency score, ε is an infinitesimal non-Archimedean constant, λ_i are the weightings and s_i^- and s_r^+ are the inputs slacks and outputs slacks respectively. If the score equals one the producer is fully efficient relative to other units. If the score is lower than one, the unit evaluated is inefficient as the sample contains other units which perform better.

This formulation of the programme is particularly attractive since, in addition to the allocation of an efficiency score to every unit, it also offers information about potential additional reductions in inputs (or potential increases in outputs) to be detected in specific cases by incorporating non-radial inefficiency or *slacks* to the DEA dual model[5]. This information is valuable and complementary to the radial efficiency score and may be extremely useful when it comes to identifying the source of possible producer inefficiencies.

[4] For an overview, see Charnes *et al* (1994), Cooper et al (2000) or Thanassoulis (2001).
[5] See Tofallis (2001) for an illustrated definition of *slacks.*

Since 1978 a large literature on DEA has been developed in order to adapt it to different frameworks (Emrouznejad *et al*, 2008). One of its main extensions is referred to the treatment of factors beyond the control of DMUs. For this purpose, the literature provides different methodological options[6]. The most common alternative to take into account these variables to construct the production frontiers is the one-stage approach (Banker and Morey, 1986; Golany and Roll, 1993), which modifies the restrictions of the standard DEA program by incorporating the uncontrollable nature of some of the inputs used. However, this approach can lead to misleading results since the technique loses discrimination power as the number of variables included in the analysis increases, regardless of whether variables have influence on results or not.

The exogenous variables can also be included in the analysis *a posteriori* though a two-stage approach (Hoff, 2007). This model calculates initial efficiency scores (θ_j) using a standard DEA model without external variables and then regress them on non-controllable variables *(Z_j)*: $\theta_j = f(Z_j, \beta_j) + u_j$. This regression is usually estimated using Tobit since efficiency scores are censored. However, more recently, Banker and Natarajan (2008) and McDonald (2009) prove that OLS provides consistent estimates in the second stage regression.

This method has been widely employed for the detection of environmental variables that can affect the process. However, it is not designed for the purpose of calculating efficiency scores that include information about exogenous variables that can condition the results of the production process.

In order to address this issue, we have opted for the three-stage model proposed in Fried and Lovell (1996) and subsequently enhanced in Muñiz (2002). This methodology allows us to calculate efficiency scores that include the effect of external variables. In addition, it is especially appropriate for the

[6] For a detailed review on different methodological options available to incorporate the effect of exogenous variables into efficiency analysis through non-parametric techniques, see Cordero *et al* (2008).

health care context, since it does not require defining the technology of production. Furthermore, the size and the characteristics of the sample used in our empirical application fit properly with the application of this technique, according to the results obtained in Cordero *et al* (2009) and Muñiz *et al* (2006) in two simulation studies in which the performance of alternative methods to include exogenous variables in DEA are compared considering several sample sizes.

This method is based on the use of total *slacks* (radial and non-radial components) of each variable obtained in the first stage. These slacks arise from two distinguishable effects: the technical inefficiency of the units and the influence of the non-discretionary inputs, which have not been included in the first analysis. The objective of these models is to distinguish between them and quantify both components. Once the decomposition has been made, it is possible to make adjustments on the original values of variables in order to discount the effect of exogenous factors. Finally, by running a DEA with corrected values of the variables, it is possible to obtain new scores that establish exclusively the efficiency level at which each producer operates.

The mechanism used for the decomposition of different factors is a DEA which incorporates slacks as controllable inputs and non-controllable inputs as outputs. This introduces a problem of minimizing inputs (slacks) subject to the value of the outputs (non-controllable inputs). In other words, the aim is to determine the extent to which the former can be reduced while taking the value of the latter to be fixed. As a result of this process the attainable target is obtained for each unit, taking into account the values of non-discretionary inputs, and the original values of variables can be corrected prior to running a final DEA with those adjusted values in a third stage[7].

[7] For more details about the formulation of this method see Muñiz (2002) pp. 628-632.

4. DATA AND VARIABLES

Database used in this application compiles information about a group of 97 Spanish primary care centres (PCC) in the Spanish Extremadura region in the year 2006. Due to the extension of the territory (41,634 squared kilometres in area) and its low population density (26.18 inhabitants per squared kilometre), the regional primary health system is structured around two different territorial administrative levels of aggregation: Health Areas and Basic Health Zones. The system is divided into eight Health Areas (Badajoz, Mérida, Don Benito-Villanueva, Llerena-Zafra, Cáceres, Coria, Plasencia and Navalmoral), each consisting of a different number of Basic Health Zones, which are all organized around a PCC as the main provider of primary health care services in the zone. Table 1 shows the distribution of units (PCCs) across health areas and population covered for each of them.

Table 1. Distribution of units across Health Areas

Health Areas	PCCs (Units)	Covered Population
Badajoz	16	260,829
Mérida	12	160,650
Don Benito-Villanueva	12	143,419
Llerena-Zafra	9	107,073
Cáceres	19	191,844
Coria	7	49,171
Plasencia	14	114,111
Navalmoral	8	54,748
TOTAL	97	1,081,845

Source: APEX06

We retrieved data from APEX06 (Vega-Cervera and Murillo-Zamorano, 2007), an integrated information system for primary care in Extremadura that provides detailed information for Health Areas and Zones on multiple variables, including the population covered, human resources, activities, costs, accessibility indicators and socioeconomic indicators.

As we mentioned in the introduction, the most commonly used indicator for health care output is the number of visits or consultations by primary care professionals. For each PCC evaluated in the study, the variables FREQUENCYGP, FREQUENCYP, FREQUENCYN, and FREQUENCYU indicate the number of visits or consultations per capita with general practitioners (GPs), paediatricians, nurses, and emergency units, respectively. Those variables are expressed in per capita terms in order to avoid the scale effect associated with the heterogeneous sizes of the Basic Health Zones considered in our study.

Regarding the input variables in the process, we use data about the labour force and prescriptions[8]. HLAB represents the per capita total number of (equivalent) medical staff, including GPs, paediatricians, nurses, nursing assistants, emergency GPs, emergency nursing assistants, physiotherapists, dentists and X-Rays technicians, while NHLAB refers to the per capita total number of non-medical staff, i.e., administrative staff, porters, veterinarians and social workers. PHARMA is the per capita number of prescriptions.

Finally, in order to include information related to exogenous variables, we have compiled a great amount of data about socioeconomic characteristics of population that can affect both the volume of activities carried out by PCCs and their efficiency level. Those variables are bound to the idea of greater pressure on demand since it can be expected. Thus, the demand of health services must be greater in those zones where there is high proportion of elderly people or a high population density. Therefore, these variables need to be considered in the calculation of the final efficiency score. Specifically, we have selected the following eight variables, all of which are significantly correlated with output indicators: gross birth rate (GBR), dependence rate (DR), maternity rate (MR), ageing rate (AR), replace rate (RR), population density (DENSITY), percentage

[8] We also considered the inclusion of a proxy variable for the capital structure of the care centre area measured in squared feet, but we finally refused to use it on the basis of statistical criteria (lack of significant effect on results) and according to results obtained in previous studies (Giuffrida, 1999). In addition, it is worth mentioning that, on average, capital accounted for only 6% of overall costs in our sample.

of population working in agriculture (AGRIEMP) and percentage of population working in services (SERVEMP).

Table 2 presents descriptive statistics of variables included in the analysis, together with their role in the productive process of a PCC.

Table 2. Descriptive Statistics of variables

Variable	Role	Average	Desv. Est.	Max.	Min.
Frequencygp	Output	10.7748	3.4283	18.9387	0.7971
Frequencyp	Output	6.5464	2.7823	17.0800	0.9500
Frequencyn	Output	7.7866	3.0488	19.1400	2.5500
Frequencyu	Output	1.6353	0.6814	3.2700	0.1900
HLAB	Input	3.0116	1.5801	9.0804	0.0711
NHLAB	Input	1.2411	0.7810	4.4987	0.2014
PHARMA	Input	21.6089	4.4121	11.6037	32.5179
GBR	Exogenous	8.0373	2.9857	22.4235	1.7932
DR	Exogenous	59.0807	13.6822	126.0028	37.4440
AR	Exogenous	23.3745	7.2971	49.3268	9.1833
MR	Exogenous	16.3483	3.4136	25.7380	6.5274
RR	Exogenous	132.1841	30.1308	261.8008	61.2121
DENSITY	Exogenous	34.0186	32.1348	187.4451	3.5417
AGRIEMP	Exogenous	33.4482	18.7954	67.3784	1.7700
SERVEMP	Exogenous	43.1527	17.1076	83.9500	19.0332

Source: APEX06

5. RESULTS

In this section we present the results obtained using the techniques explained in Section 2.1. First, we estimate efficiency scores for each unit by applying a standard DEA, i.e., without including exogenous variables, so that we can have an initial evaluation of their performance. The DEA model used in this analysis has an input orientation and considers variable returns to scale (VRS) (Banker *et al*, 1984). The input orientation was selected because the output of PCCs is determined by demand and not by the own unit, thus potential improvements in terms of efficiency should be achieved with a reduction in the use of inputs. VRS are used in order to avoid potential inefficiencies due to the

size of the units and also because this is the correct option when input or output variables are defined using ratios as it is our case (Hollingsworth and Smith, 2003).

Efficiency scores have been calculated using DEAP 2.1 software, which also estimates radial and non-radial *slacks* for each variable using a multi-stage process[9]. The inefficiency results obtained for each unit in this initial evaluation are reported in Appendix I under the label “BASIC DEA”.

According to the results obtained in this initial evaluation, the average efficiency is 0.63 and nine units (25, 30, 31, 34, 36, 55, 64, 66 and 87) are identified to be efficient, i.e., present an efficiency score of 1. In order to rank those units, the approach based on peer groups developed in Torgersen *et al* (1996) is used. Those authors conclude that a unit must be ranked higher if it was chosen as a reference by many other inefficient units. According to this criterion, the ranking result is indicated in Table 3, which shows that unit 30 is the most efficient.

Table 3. Rank of efficient units

Unit	References	Rank
25	26	3
30	67	1
31	44	2
34	4	8
36	17	7
55	2	9
64	19	6
66	20	5
87	26	4

The remaining units with relative efficiency scores of less than 1 are considered to be inefficient. We should stress that some of them present very low values (4, 35, 37, 39, 48 or 94), which can be explained by the high levels of variance detected in most of variables used in the analysis. Hence, since

[9] See Coelli (1996, 1998) for details.

DEA is a method that offers a measure of relative efficiency, when there are large differences in performance or in the use of inputs among units, some of them can be placed substantially distant from the efficient frontier.

Table 4 reports a summary of results for the eight health areas of the region. This information allows us to notice that PCCs from two areas, Caceres and Plasencia have on average the highest levels of efficiency, while the worst results are obtained by PCCs operating in Badajoz area. Likewise, it is worth noting the great differences detected among PCCs in Don Benito-Villanueva area, where the high value of the standard deviation can be explained because both four of the nine efficient units and three of the most inefficient belong to this area.

Table 4. Average efficiency scores and standard deviation in Health Areas

Health Area	**BASIC DEA (without exogenous variables)**	
	Average Score	**Rank**
Badajoz	0.4981 (0.2369)	8
Mérida	0.6157 (0.2519)	5
Don Benito-Villanueva	0.6297 (0.4231)	4
Llerena-Zafra	0.5782 (0.2582)	7
Cáceres	0.7380 (0.2398)	1
Coria	0.5784 (0.2374)	6
Plasencia	0.7050 (0.2516)	2
Navalmoral de la Mata	0.6445 (0.3382)	3
Total	**0.6311 (0.2825)**	

Efficiency scores derived from this initial evaluation would be a good indicator if all the primary care centres were operating in the same environment, which is not true in light of the information contained in Table 2 about demographic and economic variables. Therefore, information related to

exogenous variables should be included in the analysis so that we can assure that the efficiency scores reflect only the part of the production process for which the units are responsible. In this application, those new scores are calculated by incorporating data about the eight previously mentioned exogenous variables using the three-stage model described in Section 2.2.

The corrected efficiency scores obtained after applying this model are reported in the Appendix under the label “3 STAGE DEA”. In this case, the average efficiency score is 0.75, which implies a 12 percent increase with regard to the initial evaluation, and 16 units are considered to be efficient. In order to distinguish among all those PCCs with an efficiency score of 1 we have used the approach proposed in Torgersen *et al* (1996) for a second time. The results reported in Table 5 identify again the unit 30 as the most efficient.

Table 5. Rank of efficient units in 3-stage DEA

Unit	References	Rank
11	3	14
12	6	10
25	24	3
30	52	1
31	19	4
34	4	11
36	17	8
40	24	2
44	1	16
47	4	12
55	2	15
64	17	7
66	17	6
87	7	9
93	4	13
95	18	5

If we compare these new scores with those obtained with a standard DEA (without exogenous variables) we can observe that the inclusion of exogenous variables in the analysis affects notably the rank of units although the Spearman correlation coefficient between them has a high value (0.653). Specifically, there are cases such as PCCs 11, 12, 47, 93 or 95 that were

considerably inefficient in the previous analysis and become efficient after considering the characteristics of the population they see in our evaluation. In addition, other variables also undergo a significant raise although they do not become efficient (3, 4, 6, 18, 32 or 38). In contrast, only a few units have a slight decrease in their efficiency score (42, 52, 56 or 59).

Finally, the analysis of the average efficiency scores for health areas reported in Table 6 provides relevant information about the importance of considering exogenous variables in the evaluation of PCCs. Thus, units from Badajoz, considered as the most inefficient in the initial evaluation, are placed in the first in the rank (on average) after including data about population in the analysis. In contrast PCCs from Caceres and Plasencia, placed at the top of the rank with a standard DEA, obtain more discrete results in comparison with other regions in this evaluation.

Table 6. Average efficiency scores and standard deviation in Health Areas

Health Area	**3 STAGE DEA (with exogenous variables)**	
	Average Score	**Rank**
Badajoz	0.8790 (0.1456)	1
Mérida	0.7684 (0.2784)	4
Don Benito-Villanueva	0.7882 (0.3455)	3
Llerena-Zafra	0.6567 (0.3050)	7
Cáceres	0.7379 (0.2398)	5
Coria	0.5784 (0.2374)	8
Plasencia	0.6590 (0.2516)	6
Navalmoral de la Mata	0.8054 (0.3115)	2
Total	**0.7510 (0.2648)**	

6. CONCLUSIONS

In this paper we have used an excellent database about the primary health care centres in a Spanish region (APEX06) in order to conduct an analysis of their performance in terms of efficiency. Our main contribution in this area is to include variables related to the main characteristics of the population using those services in the analysis, since this factor determines the levels of provision in a great extent.

Given the uncertain specification surrounding the production function of health care, the approach used to measure efficiency is the nonparametric Data Envelopment Analysis. Specifically, we use an extension of this technique [37, 38] so that we can include data about population which are considered as exogenous variables in the analysis.

Our results show that the inclusion of these variables in the evaluation has a great impact on both the values of efficiency scores and the rank of units. Hence, an evaluation conducted without taking into account information about population could lead to misleading results, since efficiency scores assigned to some units would not reflect accurately their performance in the process of providing health care services.

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APPENDIX

Efficiency scores in BHZ without and with exogenous variables

Health Area	Basic Health Zone (Units)	BASIC DEA		3 STAGE DEA	
		Score	Rank	Score	Rank
Badajoz	1	0.6497	48	0.9837	30
	2	0.7652	39	0.7664	59
	3	0.2473	84	0.9994	23
	4	0.0786	96	0.7538	61
	5	0.2365	89	0.7709	57
	6	0.2092	91	0.9466	36
	7	0.7014	43	0.9999	17
	8	0.6807	46	0.9999	18
	9	0.6771	47	0.8874	45
	10	0.6992	44	0.9993	24
	11	0.6158	53	1.0000	14
	12	0.2446	87	1.0000	10
	13	0.2462	85	0.5814	69
	14	0.7078	42	0.7078	63
	15	0.6315	51	0.9969	25
	16	0.5791	56	0.6712	65
	HA Average Score	**0.4981**		**0.87.90**	
Mérida	17	0.8966	24	0.9999	19
	18	0.3489	77	0.9997	21
	19	0.4802	68	0.9999	20
	20	0.6013	54	0.9099	39
	21	0.7795	36	0.7795	55
	22	0.6383	50	0.8887	43
	23	0.5397	63	0.5397	76
	24	0.2579	83	0.2579	92
	25	1.0000	3	1.0000	3
	26	0.2459	86	0.2459	93
	27	0.8892	25	0.8892	42
	28	0.7104	41	0.7104	62
	HA Average Score	**0.6157**		**0.7684**	
Health Area	**Basic Health Zone (Units)**	**BASIC DEA**		**3 STAGE DEA**	
		Score	**Rank**	**Score**	**Rank**
Don Benito - Villanueva	29	0.8788	28	0.8788	47
	30	1.0000	1	1.0000	1
	31	1.0000	2	1.0000	4
	32	0.2254	90	0.9997	22
	33	0.9900	12	0.9900	28
	34	1.0000	8	1.0000	11
	35	0.1523	93	0.1523	95
	36	1.0000	7	1.0000	8

	37	0.0878	95	0.0878	97
	38	0.2384	88	0.8679	49
	39	0.0718	97	0.4815	81
	40	0.9120	21	1.0000	2
	HA Average Score	**0.6297**		**0.7882**	
Llerena -Zafra	41	0.9798	15	0.9798	32
	42	0.7545	40	0.7543	60
	43	0.2806	82	0.2806	91
	44	0.8466	30	1.0000	16
	45	0.5760	57	0.5760	70
	46	0.5836	55	0.5836	68
	47	0.4464	69	1.0000	12
	48	0.1751	92	0.1751	94
	49	0.5609	59	0.5609	72
	HA Average Score	**0.5782**		**0.6567**	

Health Area	Basic Health Zone (Units)	BASIC DEA		3 STAGE DEA	
		Score	Rank	Score	Rank
Cáceres	50	0.8281	33	0.8281	52
	51	0.6271	52	0.6271	67
	52	0.7745	37	0.7739	56
	53	0.9953	10	0.9953	26
	54	0.3852	73	0.3851	85
	55	1.0000	9	1.0000	15
	56	0.3883	72	0.3881	84
	57	0.8766	29	0.8766	48
	58	0.7940	34	0.7940	53
	59	0.4928	67	0.4923	80
	60	0.4041	70	0.4041	82
	61	0.9538	18	0.9538	35
	62	0.9923	11	0.9923	27
	63	0.7830	35	0.7830	54
	64	1.0000	6	1.0000	7
	65	0.8302	32	0.8302	51
	66	1.0000	5	1.0000	6
	67	0.3766	75	0.3766	86
	68	0.5193	66	0.5193	79
	HA Average Score	**0.7380**		**0.7379**	
Coria	69	0.3275	79	0.3275	88
	70	0.3239	80	0.3238	89
	71	0.7708	38	0.7708	58
	72	0.5274	64	0.5274	77
	73	0.5462	60	0.5462	73
	74	0.9900	13	0.9900	29
	75	0.5633	58	0.5633	71
	HA Average Score	**0.5784**		**0.5784**	

Health Area	Basic Health Zone (Units)	BASIC DEA		3 STAGE DEA	
		Score	Rank	Score	Rank
Plasencia	76	0.5197	65	0.5197	78
	77	0.9648	17	0.9648	34
	78	0.9815	14	0.9815	31
	79	0.3175	81	0.3175	90
	80	0.9331	20	0.9331	38
	81	0.8464	31	0.8464	50
	82	0.5424	62	0.5424	75
	83	0.8886	26	0.8886	44
	84	0.6954	45	0.6954	64
	85	0.8838	27	0.8838	46
	86	0.3554	76	0.3554	87
	87	1.0000	4	1.0000	9
	88	0.5445	61	0.5445	74
	89	0.3967	71	0.3967	83
	HA Average Score	**0.7050**		**0.6590**	
Navalmoral de la Mata	90	0.9014	23	0.9014	41
	91	0.9427	19	0.9427	37
	92	0.6423	49	0.6423	66
	93	0.3352	78	1.0000	13
	94	0.0887	94	0.0886	96
	95	0.3773	74	1.0000	5
	96	0.9018	22	0.9018	40
	97	0.9662	16	0.9662	33
	HA Average Score	**0.6445**		**0.8054**	
TOTAL AVERAGE SCORE		**0.6311**		**0.7510**	

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