

Determinants of Primary Health Care Centers Economic and Production Efficiency

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Background Information

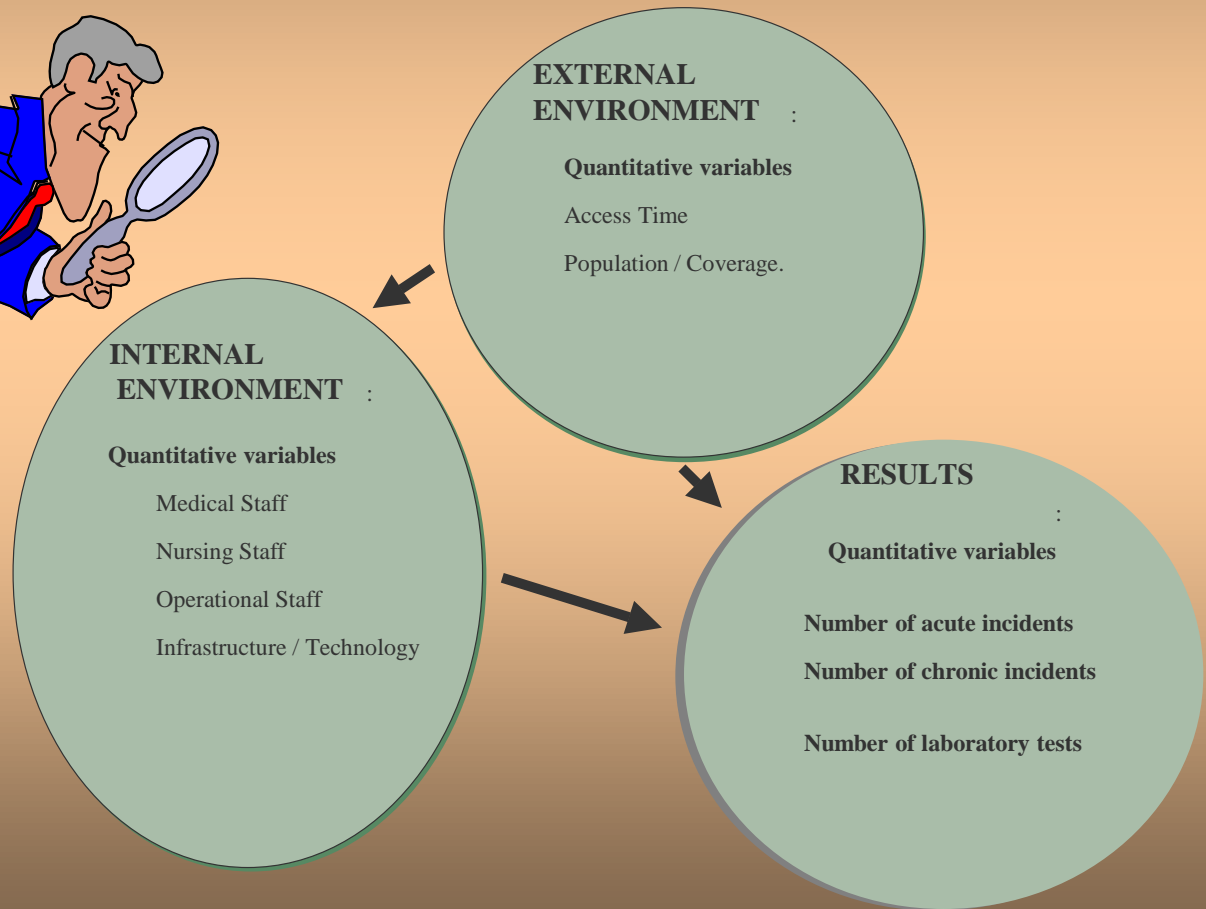
- **In the present contribution an attempt is made to analyze the use of resources and assess the efficiency of the Primary Health Care Units (PHCU) of the Social Insurance Organization (S.I.O.) of Greece. S.I.O. constitutes the largest public health insurance organization in the country, providing health care to over 50% of the Greek population. The primary health care sector of S.I.O. is, in effect, the most significant service provider as the number of visits to local branch units. The study was applied to 78 medical branch units throughout Greece, with data from the year 2005.**

Nature of the Evaluation Problem

- What are the *real needs of* S.I.O. System (ph. technological equipment, human dynamic, quality of provided care) in the base of the present demand for health services (types of diseases, span of provided services)?
- What it is the *current situation of system* this moment (follow-up of system)?
- Which are the *objectives* that should be achieved (reduction of used resources, increase of production, access or effectiveness goals, levels of demand - utilization)?
- How we will reach in the *achievement of* these objectives (are methods that supported in operational models and applications of modern techniques of administration)?



Critical Internal and Exterior Factors affecting the Effectiveness Status of Primary Health Services



Proposed Model & Methodology

The criterion of productivity refers to the operational efficiency of the system that is to say at what degree the transformation of the resources (input) of the system to output is productive. The attempted approach is analyzed in table

CRS – Model,

$$E_k^{CRS} = \left\{ \begin{array}{l} \min_{\theta, \lambda_j} \quad \theta \left\{ \sum_{j=1}^n \lambda_j x_{ij} + s_i = \theta x_{ik} \quad \forall i; \sum_{j=1}^n \lambda_j y_{rj} - s_r = z_{rj} \right. \\ \left. \lambda_j, s_i, s_r \geq 0 \text{ and } \theta \text{ free} \right\} \end{array} \right.$$

Table : Output – Input
of the productive process of S.I.O.

Inputs	Outputs
I₁: No. of medical staff	O₁: Number of acute incidents
I₂: No. of nursing staff	O₂: Number of chronic incidents
I₃: Population covered	O₃: Number of laboratory tests

VRS – Model,

$$E_k^{VRS} = \left\{ \begin{array}{l} \min_{\phi, \mu_j} \quad \phi \left\{ \sum_{j=1}^n \mu_j x_{ij} + d_i = \phi x_{ik} \quad \forall i; \sum_{j=1}^n \mu_j y_{rj} - d_r = k_j; \sum_{j=1}^n \mu_j = 1, \right. \\ \left. \mu_j, d_i, d_r \geq 0 \text{ and } \phi \text{ free} \right\} \end{array} \right.$$

Figure 1 - PHCUs Profiling Against Frontier

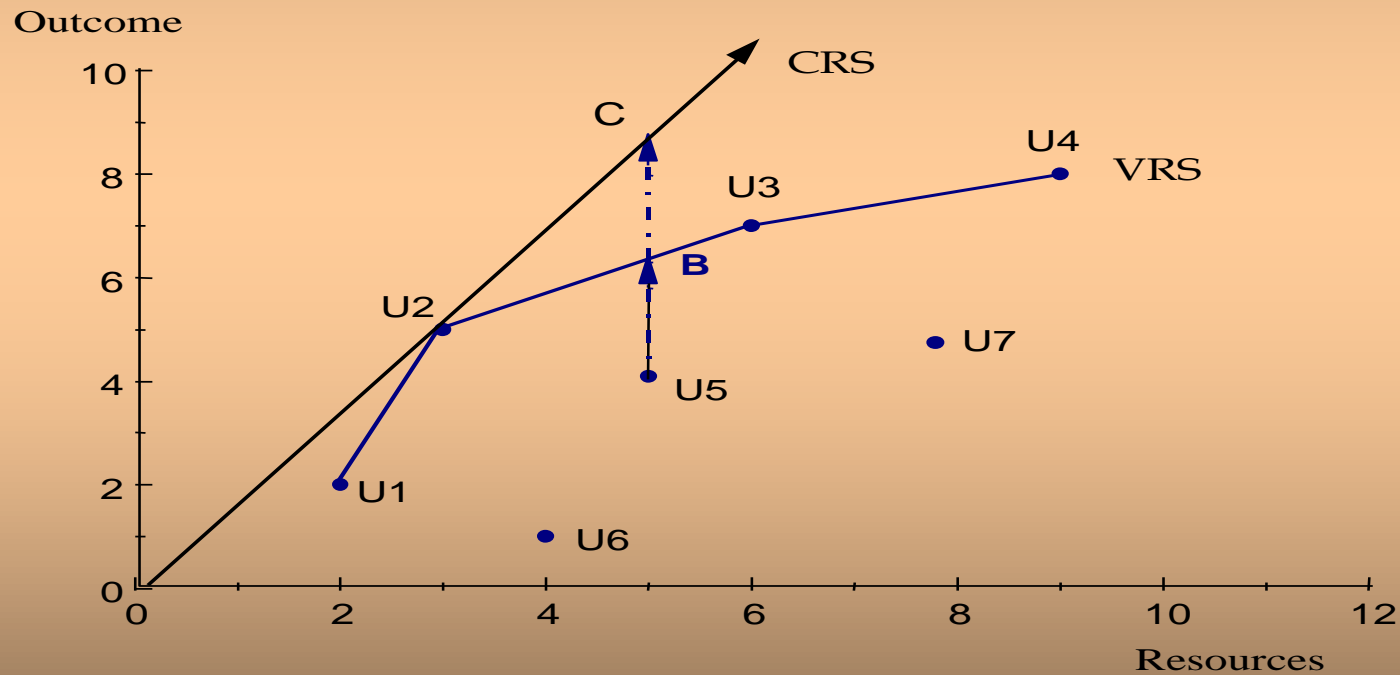
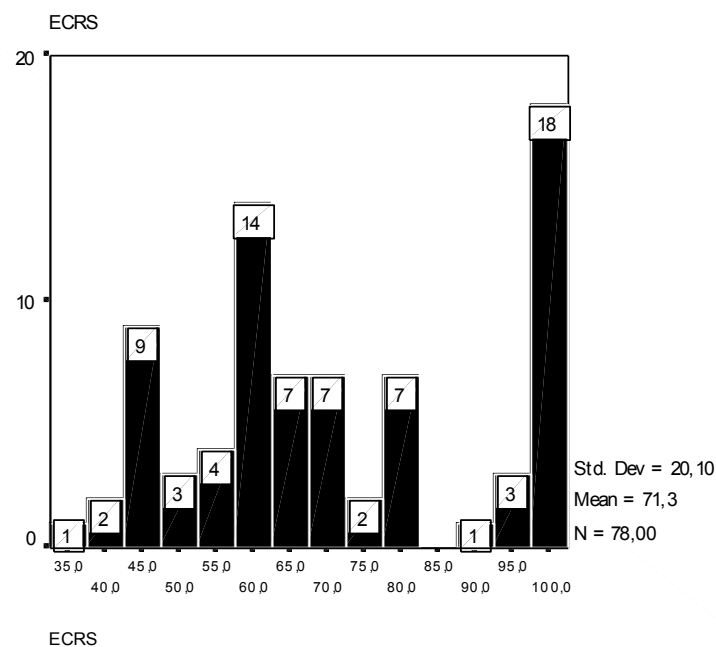


Table 2 : ECRS for 78 PHCUs

Statistics

ECRS

N	Valid	78
	Missing	0
Mean		71,3178
Std. Error of Mean		2,2760
Median		66,7400
Mode		100,00
Std. Deviation		20,1034
Variance		404,1453
Range		63,01
Minimum		36,99
Maximum		100,00
Percentiles	25	57,5650
	50	66,7400
	75	95,5200



• *Table 3 - Efficient PHCUs*

Efficient PHCUs			
Location	Peers	Location	Peers
1. Kiato	47	10. Kimis	6
2. N.Kosmos	32	11. Naupaktos	6
3. Kiparisias	26	12. Ierapetras	5
4. Agrinio	26	13. Kalitheas	5
5. Trikala	17	14. Xanthi	5
6. Dramas	16	15. Kalamatas	3
7. Pirgos	14	16. Egio	2
8. Megalopolis	11	17. Axioupolis	1
9. Nikeas	10	18. S.Nikolaos	1

Table – Inefficient PHCUs

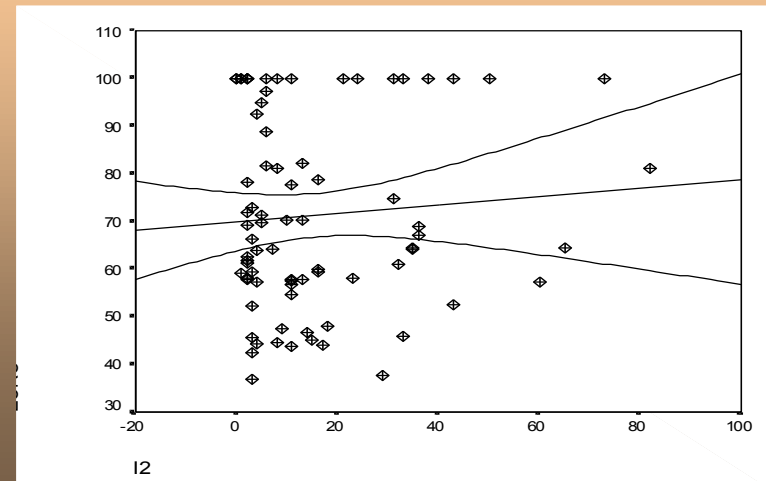
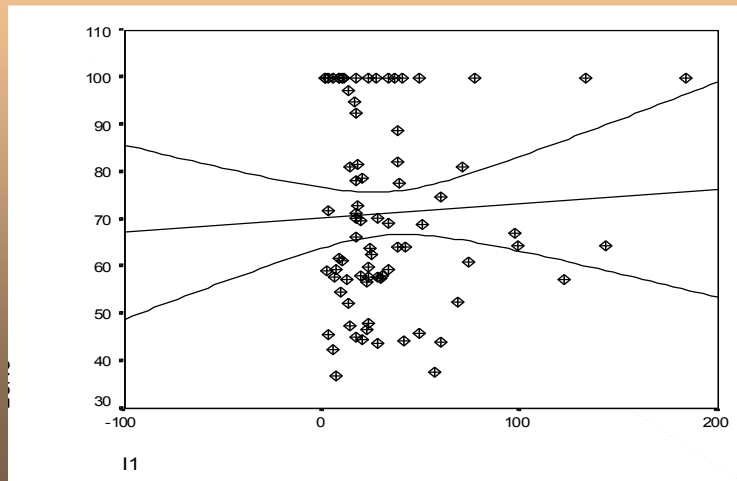
No	PHCUs	E ^{CRS}	Reg. Group	No	PHCUs	E ^{CRS}	Reg. Group
1.	Lagadas	36,99	L.U.C.	31.	Grevena	61,32	
2.	S.Sofia	37,78	L.U.C.	32.	Lefkada	61,66	
3.	Inofita	42,45		33.	Argostoli	62,48	
4.	Moschato	43,70	L.U.C.	34.	Chios	63,87	
5.	St.Paraskevi	44,13	L.U.C.	35.	Korfu	64,04	
6.	Zografou	44,27	L.U.C.	36.	Katerinis	64,07	L.U.C.
7.	Ptolemaida	44,54		37.	Patisia	64,50	L.U.C.
8.	Rethimno	45,11		38.	Axiou G.	64,50	L.U.C.
9.	Soufli	45,68		39.	Kilkis	66,34	L.U.C.
10.	Alexandroupoli	45,83		40.	N.Ionia	67,14	L.U.C.
11.	Ano Polis	46,70		41.	Serres	69,01	L.U.C.
12.	Preveza	47,47		42.	Sparti	69,14	
13.	Komotini	47,90		43.	St.Stefanos	69,82	
14.	Aspropirgos	52,23	L.U.C.	44.	St.Ierotheos	70,30	L.U.C.
15.	Egaleo	52,49	L.U.C.	45.	Giannitsa	70,33	L.U.C.
16.	Florina	54,57		46.	Salamina	71,23	L.U.C.
17.	N.Liosia	56,75	L.U.C.	47.	Sitia	71,92	
18.	Alexandria	57,22	L.U.C.	48.	Amalida	72,94	
19.	Alexandras	57,40	L.U.C.	49.	Chania	74,68	
20.	Vironas	57,62	L.U.C.	50.	Ilioupolis	77,59	L.U.C.
21.	Edessa	57,73	L.U.C.	51.	Kastoria	78,24	
22.	Koropi	57,80	L.U.C.	52.	Arta	78,83	
23.	Aliveri	57,86		53.	Patra	81,10	
24.	Mitilini	58,06		54.	Messologi	81,21	
25.	Argos	58,18		55.	Naousa	81,62	L.U.C.
26.	Aliatros	59,15		56.	Veria	82,26	L.U.C.
27.	Igoumenitsa	59,37		57.	Galatsi	88,74	L.U.C.
28.	Drapetsona	59,41	L.U.C.	58.	Ermioupolis	92,58	
29.	St.Alexios	59,86		59.	Thiva	94,94	
30.	Sq.Attikis	60,88	L.U.C.	60.	Amfissa	97,26	

For example, the DMU no 30, in order to become efficient must exceed overall the output mix or reduce input mix by 39,12% (=100,00-60,88), which represent the "target" distance from the efficient frontier. It is noted that the inefficiency of the examined unit (as extracted by solving the LP model) is determined by the convex combination of the efficient comparators units (peers) no 1,2,3,7, of the table3, which are located on the efficient frontier.

Table 5 - PHCUs Regional Efficiency Assessment

•Regions	Number of PHCUs	No Efficient PHCUs	•Cost Efficiency			
			Mean	St.Deviation	Median	Min
Large Urban Centers	32	4	66,063	17,813	64,285	36,99
Urban Areas	46	14	74,937	20,976	72,430	42,45
<i>Total</i>	78	18	71,317	20,103	66,740	36,99

Figure 2 - PHCUs Regional Efficiency Assessment and Human Resources



Conclusions

- A. The results indicate that in large urban centers PHCUs face an efficiency disadvantage compared to rural areas one's. The efficiency differences in two different groups were also verified statistically by means of t-test and Kruskal-Wallis statistical tests. The analysis of the results shows that even though the existing medical coverage exhibits in large urban centers the ECRS does not follow an analogous increase under the hypothesis that the absence of medical staff lead to a decrement of productivity of PHCUs. Conversely urban areas appears more efficient, even though they possesses the highest number of beneficiaries per doctor. .
- B. A logical explanation to the above state is that the inflow of patient cases from large urban centers confront reability problems in health provision of PHCUs (underutilization) and they tent to seek health care in other forms of medical provision (private or hospital). This result indicates that the centralization of health provision has led to the creation of very large health supply centers in large urban centers that need to reduce their capacity in favor of urban areas. The lack of qualitative data concerning medical outcomes prohibits any firm conclusions as to whether the concentration of health services in the large urban centers reduces the level of quality of the system.