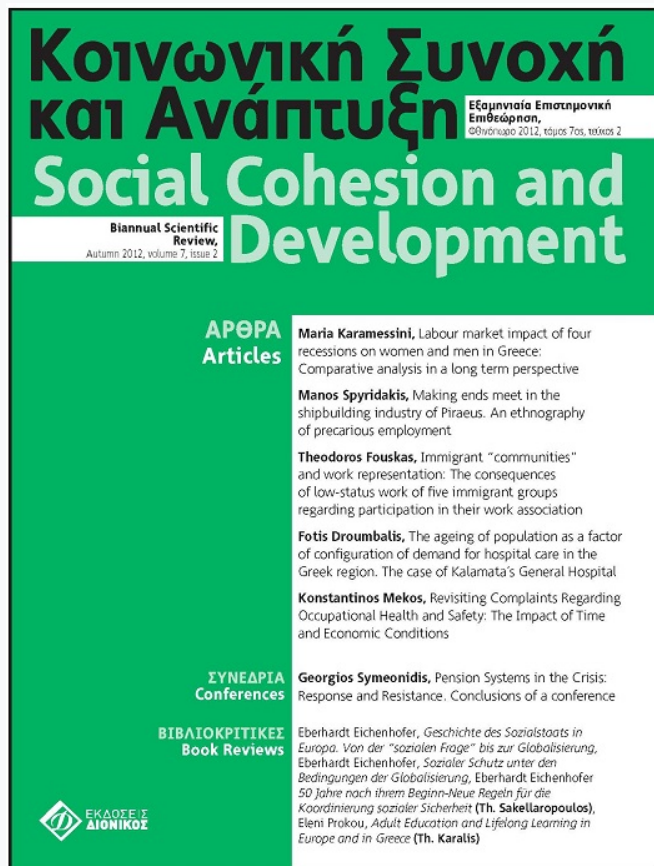


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# The ageing of population as a factor of configuration of demand for hospital care in the Greek region. The case of Kalamata's General Hospital

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## Η γήρανση του πληθυσμού ως συντελεστής διαμόρφωσης της ζήτησης για νοσοκομειακή περίθαλψη στην ελληνική περιφέρεια. Η περίπτωση του Γενικού Νοσοκομείου Καλαμάτας

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### ABSTRACT

The present paper examines the quantitative characteristics of the burden that a local hospital (General Hospital of Kalamata) bears as a result of the ageing of the local population (Messenia pre-fecture), taking into thorough consideration the excessive demand for hospital care services required by the aged. The analysis is based on primary data of patient flow of the General Hospital of Kalamata during the period 1991-2009. The findings show that there are explicit indications of "hospitalization of the aged", while the extent of burden that the hospital system bears from the ageing population of the Messenia pre-fecture depends on the measures used for identifying the demand. At any rate, in the present case, it seems that the relationship existing between the ageing population and hospital care services is at a part, a matter of modernization and reformation of the "mix" of care offered to the aged by the local health care system.

**KEY WORDS:** Ageing, aged, demand for hospital care services, length of stay

### ΠΕΡΙΛΗΨΗ

Στα πλαίσια της ευρύτερης αντίληψης περί υπερβάλλουσας ζήτησης νοσοκομειακών υπηρεσιών από τους ηλικιωμένους, στο παρόν άρθρο εξετάζονται τα ποσοτικά χαρακτηριστικά της επιβάρυνσης που δέχεται ένα τοπικό νοσοκομειακό σύστημα (Γενικό Νοσοκομείο Καλαμάτας) εξαιτίας της γήρανσης του τοπικού πληθυσμού (νομού Μεσσηνίας). Η ανάλυση βασίζεται σε πρωτογενή δεδομένα νοσοκομειακής κίνησης του ΓΝ Καλαμάτας, για το χρονικό διάστημα 1991-2009. Τα συμπεράσματα δείχνουν ότι υπάρχουν σαφείς ενδείξεις "νοσοκομειοποίησης του γήρατος", ενώ το μέγεθος της επιβάρυνσης του νοσοκομειακού συστήματος από τον ηλικιωμένο πληθυσμό του νομού εξαρτάται από τα χρησιμοποιούμενα μέγεθρα προσδιορισμού της ζήτησης. Πάντως φαίνεται ότι η σχέση γήρανσης πληθυσμού και νοσοκομειακής περίθαλψης είναι κατά μέρος και ζήτημα εκσυγχρονισμού και αναμόρφωσης του "μείγματος" της προσφερόμενης φροντίδας στους ηλικιωμένους από το τοπικό υγειονομικό σύστημα.

**ΛΕΞΕΙΣ-ΚΛΕΙΔΙΑ:** Γήρανση, ηλικιωμένοι, ζήτηση νοσοκομειακών υπηρεσιών, διάρκεια νοσηλείας

## 1. Theoretical approach of the issue of hospitalization of the elderly

**D**emographic ageing of the population consists one of the current predominant social problems (Gilford, 1988, Haber, 1989, Robolis, Chletsos, 1995, Oikonomou, 2004, Sakellaropoulos, 2007, Schofield et al., 2006, DeFrances et al., 2008, Wier et al., 2010). Particularly in developed countries, the increase of the elderly population has caused a strong scientific interest concerning the potential consequences both at social and economic level (Land and Lamb, 2008, Rechel et al., 2009, Martin, 2010). Most interestingly, ageing is not determined based on actual biological data but on age criteria. Thus, age does not function only as a cultural marker of «voluntary transfer» of citizens from the state of being economically active to becoming eligible for statutory and occupational pension but it also consists the «interpretative tool» of determining biological age (Agrafiotis, 2003, Nettleton, 2006).

Biological ageing is defined as the process of deviation from the normal functions of the human body with the appearance of specific symptomatology. Collaterally, it is experienced as a process of natural decline of physical and mental functions and as a pathological condition with the emergence of symptoms or diseases which lead to the loss of the structure as well as the function of the organic systems of the human body (Symbardis et al., 2004, Ferraro, 2006, Cutler and Mattson, 2006).

An essential feature of the diseases the elderly suffer from is the recurrence of diseases (chronic disease) which increases the rate of prevalence, morbidity and mortality of the elderly. This contributes to the appearance of secondary diseases and inability which in turn increase the complexity of the pathological condition (Spatharakis, 1999) and put additional burden to the health of the elderly.

The diseases known as diseases of decay (neoplasia, degenerative disorders, weakening of memory, symptoms of senility, Alzheimer disease, Parkinson disease, malfunction of the sensory organs and the organs of the respiratory system, decline of lung functionality etc) seem to be indirectly related to ageing. (Dontas, 1981, Gournas, 1994, Factor et al, 2002, Gratton et al, 2003, Loch et al , 2004, Greenland, 2004, Foster, 2006, Dunne et al 2011).

At international level and regardless of the definition of ageing either as a chronological limit or a biological deviation from the normality, both preventive and interactive mechanisms of health care are applied for the treatment of the elderly. Although empirical studies demonstrate that interventive health care (restoration of health) consists a less cost-effective health care process it remains the base of the health care of the elderly (Kyriopoulos, 2000, Stefan is, 2000). According to Cameron, (2003), Schultz, (2004), Kleinpell et al, (2008), Chiou, (2009), a significant part of the processes of health restoration of the elderly is provided by the hospital system, in the form of hospitalization, while the recurrence and the complexity of the diseases the elderly suffer from seem to increase the demand for hospital services in relation to other age groups (Schultz et al., 2004).

The particularities in relation to the processes of health restoration of the elderly in combination with the observed ageing of the population, raise concerns related to the possible consequences of ageing on the hospital subsystems of the developed countries (hospital care demand) and on the corresponding insurance systems at an economic level (Dang et al., 2001, Jacobzone, 2001, Mandrel, 2003, Rechel et al., 2009, Leuca and Fastenmeier, 2011).

The results of empirical studies at international level concerning the impact of ageing on the demand for health care seem to vary. Thus, according to some researchers the increase of the elderly population (Rechel et al., 2009) and the ageing of the elderly (Goebeler et al., 2004, DeFrances et al., 2008, Wier et al., 2010) seem to be basic reasons of increased demand for hospital services by this age group. This demand is further increased by the absence of efficient management of the

subsystems of health care of the elderly (Leuca and Fastenmeier, 2011), the limited contribution of unofficial health care for the elderly and the absence of gate-keeping (Masseria et al., 2009) in patient transfer from the primary health system to hospitals. Characteristic of this attitude of the increasing hospital services demand by the elderly, is the use of terms such as “hospitalization of the elderly” or “elderlization of the hospital” (Yfantopoulos, 1985, Schulz, 2004).

As apposed to the above, there is research which demonstrates that the increase of the elderly population is not necessarily accompanied by an increase in hospital care demand (McKee, 2004). Characteristic is the case of a study in Australia (Gray et. al., 2004) which demonstrates that in a diachronic assessment (1993-2002) of the data of hospital care in the total of the Australian states, despite an 18% increase of the elderly population and a 10% increase of the total population in the given time, the use of hospital beds among the elderly decreased (for example a 10% decrease was reported in the use of hospital beds by senior citizens over 70 years of age), but it increased by 1% among the younger population (under 65 years of age). Similar results were found in Italy, in a research conducted by Liotta et. al., (2011), in which for the period 1996-2006 a decrease in the use of the hospital system by the elderly was noted basically due to a policy decision to decrease the available beds and the improvement of the quality in the provided health services besides hospital care.

In Greece, the issue of the relation between the ageing population and the demand for hospital care seems to have preoccupied the academic community for the last twenty years although it should be mentioned that constraints in research exist owing to poorly resourced health facilities. (Papoutsis, 1997, Neggis, 1997, Triantafillou, 2005)

On attempting to map the field, differences are identified in the results of research in relation to the extent of the impact of the Greek population on the demand for hospital care and the resulting cost. Georgousis and Kyriopoulos (1996), note that the increase of the elderly seems to increase the demand for health services as well as the corresponding expenditure for their care. Towards the same trend are the conclusions of the econometric study of Yfantopoulos (2000), according to which the per capital health care expenditure for adults over 65 is many times as large as the expenditure for adults under 65, which rises as the age of the elderly increases. In addition, a research conducted by Kyriopoulos et al., (2003) (via questionnaires) demonstrates that during a month the average rate of hospital admissions per person for the age group 32-45 is 0,025 , reaches 0,077 for the age group 61-75 and 0,095 for individuals aged 76 and over.

In contrast, in a relative research Robolis and Chletsos (1995) view ageing as “a restructuring and serious problem of the Greek society” but nevertheless note that the deficit in the Greek social security funds should not be attributed exclusively to the issue of ageing and the resulting higher expenditure but also to other related factors such as financial crisis, tax evasion etc.

Similarly, Theodorou et al., (1996), Stasinopoulou, (1999), Sissouras, (2000), Sigalas, (2000), Masseria et al., (2009) conclude that other factors apart from ageing have formed the conditions for the hospitalization of the elderly such as over-supply of doctors, uncontrolled relation of the medical –technological complex, inefficiency of the Greek NHS to offer alternative forms of health care, absence of gate-keeping towards and from hospitals which leads citizens to apply their own strategies of admission to the hospital system, self-referred uncontrollably (Theodorou et al., 1996, Sigalas, 2000, Theodorou et al., 2009) and the contradictory policies applied during the period of the NHS (functional degradation of primary care and reinforcement of the hospital sector) (Robolis, 1999, Souliotis and Lionis, 2003, Adamakidou and Kalokerinou, 2010).

Following the aforementioned, the present study attempts to further explore the impact of Greek population ageing on the demand for hospital care, by examining the consequences of ageing at a local level (prefecture of Messinia) and a local hospital system (General Hospital of Kalamata).

## 2. Data and methodology

The choice of the prefecture of Messinia and the General Hospital of Kalamata for this case study is due to a number of factors related to the characteristics of the prefecture and to the possibility of research which the hospital offers. More specifically, the prefecture of Messinia possesses the features of a typical Greek prefecture of the periphery namely complex geomorphology, primary and tertiary production, agriculture-tourism and a population with strong characteristics of ageing. The hospital of Kalamata is considered a middle sized hospital (323 bed capacity) which possesses data of hospital admissions in chronological order (1991-1996 manuscript and 1997-2009 in electronic form ) which quite accurately record the actual hospital admissions.

As for the quantitative examination of the characteristics of the demand for hospital services by the elderly of the prefecture of Messinia, primary data from the general hospital of Kalamata was used for the period 1991-2009 which was taken from the register of patients' admission of the hospital. The total number of the elderly patients who were hospitalized was examined during a period of 17 years (1991-2000 and 2003-2009) i.e. 174.845 hospital admissions.

The study focused on two major factors-determiners of hospital care demand: patient admission and length of hospitalization (Yfantopoulos, 2003). Due to the fact that an independent examination of the two above mentioned factors may be misleading (i.e. in the case of an increase in admissions and concurrently a decrease in the duration of hospital stay), annual sum of days spent in hospital is additionally examined since hospitalization cost of a patient per day depends on fixed per diem reimbursement

## 3. Results

### 3.1 Population features

Three seem to be the essential features of population development in the prefecture of Messinia during the period 1981-2001(table 1):

**Table 1. Indicators of population changes in the prefecture of Messinia and Greece (in parenthese), for the period 1981-2001**

Indicators/Years	1981	1991	2001
<b>Population</b>	159.811 κατ.	166.964	176.876
<b>Natural population balance*</b>	0,91 (1,7)	0,68 (1,09)	0,62 (1,00)
<b>Ageing**</b>	87,8% (53,7%)	106,7% (71,1%)	146,7% (110,1%)
<b>Dependence***</b>	74,4% (52,3%)	61,1% (49,1%)	56,5% (46,8%)
<b>Proportion of aged****</b>	19,9% (12,8%)	19,6% (13,69%)	21,5% (16,7%)

Source: Greek National Statistical Organisation, results of census of population 1981, 1991, 2001

\* Proportion of births to deaths

\*\* Proportion of elderly per 100 children 0-14 years old

\*\*\* Proportion of "not productive individuals" (0-14 and 65+ of years) per 100 "productive" individuals of (15-64)

\*\*\*\* Rate of elderly (65+) per 100 population

1. The observed diachronic population growth in the prefecture of Messinia which, according to data, is not a result of natural increase of the population (the balance is below one) but a result of the influx of population, primarily of economic immigrants, pensioners and adults at an economically productive age from large urban centres, seeking better life conditions in the Greek region which improved after the beneficiary allocation of European resources following the admittance of Greece in the EU (National School of Public Health, 2003, p. 138). This seems to be an accelerative factor regarding the future increase of the elderly in the prefecture.
2. Ageing seems to be the predominant demographic phenomenon in the prefecture of Messinia with the features of ageing appearing more intensely than those which characterise the total country. It should be mentioned that the proportion of the elderly for 2001 (21,5%) not only exceeds considerably the average of the country (16,7%) but it also approaches 30 years earlier the estimated proportion of elderly/total population of 2003 for the whole country (EL. STAT. 2006, Bagavos, 2004).
3. During the decade of the '90s significant changes in the composition of the ageing population (table 2) are seen with the rapid increase of senior citizens. This fact, augurs gradual ageing of senior citizens in the immediate and distant future which will lead from the middle of 2010 to a significant rise in the number of the very old in the prefecture.

**Table 2. Distribution of aged people at groups of age in the prefecture of Messinia, 1991-2001**

Age-related groups	1991		2001	
	Population	%	Population	%
<b>65-74 (third age)</b>	16.876	53,3	23.038	60,7
<b>75-84 (fourth age)</b>	12.339	39	11.399	30
<b>85+ (fifth age)</b>	2.446	7,7	3.512	9,3
<b>Total</b>	31.661	100	37.736	100

Source: Greek National Statistical Organisation, results of census 1991, 2001

Consequently, rapid population ageing in the prefecture compared to the rest of the country and mainly the observed alteration of the composition of the elderly population towards the fourth and fifth age groups, seem to facilitate the appearance of chronic diseases and to intensify the processes of deterioration of the physical mechanisms of the human organism (Sybarite and Manettas, 2004, Condelius et al., 2008, Kleinpell et al., 2008). As a result, the potential use of the hospital system by the elderly and the very old in the prefecture, occurs.

### ***3.2 Hospital Admission of the elderly***

On first approaching the issue of the development of hospital admissions of the elderly at the general hospital of Kalamata during the period 1991-2009 (table3) and despite the fact that the number of inpatients doubled, it appears that:

**Table 3. Aged people admissions for hospitalisation in Kalamata's General Hospital, 1991-2009**

Year	Total admissions for hospitalization	Admissions of inpatients (65+)	Admissions of inpatients (-65)	% annual change of admissions of (65+) inpatients	% annual change of admissions of (-65) inpatients	Admissions rate (aged to total inpatients)
1991	13717	4858	8859			35,42%
1992	14707	5452	9255	5,37%	4,47%	37,10%
1993	15146	5745	9401	12,23%	1,58%	37,93%
1994	15291	6044	9247	5,20%	1,64%	39,53%
1995	15965	6612	9353	9,40%	1,15%	41,42%
1996	15701	6691	9010	1,20%	-3,67%	42,62%
1997	16292	7127	9165	6,52%	1,72%	43,75%
1998	17095	7300	9795	2,43%	6,87%	42,00%
1999	17862	7502	10360	2,77%	5,77%	42,00%
2000	18586	8096	10490	7,92%	1,25%	43,56%
2001	19707	9018	10689	11,40%	1,90%	45,76%
2002	20431	9978	10453	10,65%	-2,20%	48,84%
2003	22156	10952	11204	9,76%	7,20%	49,43%
2004	23654	12052	11602	10,00%	3,55%	50,95%
2005	24262	12366	11896	2,60%	2,53%	50,97%
2006	25441	13036	12405	5,42%	4,28%	51,24%
2007	25887	13863	12024	6,34%	-3,07%	53,55%
2008	26218	14195	12023	2,40%	0,00%	54,14%
2009	26524	13958	12566	-1,67%	4,52%	52,62%

- The participation of the elderly in the hospital's admissions tripled (from 4858 in 1991 to 13958 inpatients in 2009) and
- The percentage of the elderly inpatients at the general hospital of Kalamata in relation to younger group ages doubled between 1991 and 2009 (from 35,42% in 1991, to 52,62% of the total inpatients in 2009).

At this point it should be mentioned that the increase is both diachronic (it occurs during the whole period under examination) and intense (the annual rate of increase during the 12 years of the study was over 5%). This diachronic rapid increase led, in the year 2004, to the historic record of the elderly being more than 50% of the total inpatients of the general hospital of Kalamata, a reality which still exists since then.

All the aforementioned consist the features of the dynamics in the use of hospital care by the elderly while the general hospital of Kalamata appears to be a facility of health care mainly for the elderly, a reality which enhances the scientific view concerning the elderlization of the Greek hospital.

Furthermore, according to the data in table 4, it seems that the population of the elderly inpatients is becoming older since between 1991 and 2009 a gradual shift appears from the third age group (65-74) to the fourth age group (75-84) and mainly to the fifth age group (85+).

**Table 4. Distribution of aged population per age-related groups, in the prefecture of Messinia (census 1991,2001) and distribution of admissions of aged inpatients in Kalamata's General Hospital, per age-related groups, 1991 and 2009**

	% distribution of aged people per age-related groups (census 1991)	% distribution of admissions of aged inpatients per age-related groups (1991)	% distribution of aged people per age-related groups (census 2001)	% distribution of admissions of aged inpatients per age-related groups (2009)
<b>65-74</b>	53,30	40,10	60,70	33,61
<b>75-84</b>	39,00	42,98	30,00	44,33
<b>85+</b>	7,70	16,91	9,30	22,06

The importance of the findings lie in the fact that as the age of the elderly inpatients increases the possibilities of developing complex pathology (multiple diagnosis) increases as well, the cases become more complicated in terms of treatment and restoration probably goes beyond the capability of a "one-dimension" clinic treatment.

### ***3.3 Complex pathology - multiple diagnosis***

As mentioned before, complex pathology, a characteristic of the elderly, aggravates on their morbidity. At the level of hospital care, it is revealed mainly through multiple diagnoses of diseases (multi diagnosis) which includes the main diagnosis and the secondary diagnoses. The question is whether and to what extent multiple diagnoses characterise the population of the present study.

At least one out of two admissions of elderly patients at the General Hospital of Kalamata is a complex case, i.e. with more than one admission diagnosis (table 5). The phenomenon of multiple diagnoses appears without much differentiation at all three age groups (65-74 at 52,47%, 75-84 at 51,24% and 85+ at 52,9%) with two or more diagnoses. At this point it should be marked that at least 20% of the elderly are admitted with three or more diagnosed diseases. This implies that at the level of nursing care for 2009 for example, 7323 cases of elderly had multi-level medical care and 2800 of those had three or even more diagnoses on being admitted.

**Table 5. Admissions distribution, of elderly in Kalamata's General Hospital, by the number of diagnoses per admission and per age-related groups, 1991-2000**

Age /Diagnoses	no diagnosis (%)	with one diagnosis (%)	with two diagnoses (%)	with three diagnoses (%)	with four diagnoses (%)	with five diagnoses (%)
	2,06	47,53	32,63	12,24	4,23	1,31
<b>65-74 (N=29817)</b>	2,10	48,76	32,50	11,53	3,89	1,22
<b>75-84 (N=24062)</b>	1,97	47,09	32,89	12,41	4,34	1,30
<b>85+ (N=11474)</b>	1,74	45,49	32,53	13,75	4,89	1,59

No data available after 2000, due to the change of method of recording of diagnoses in hospital

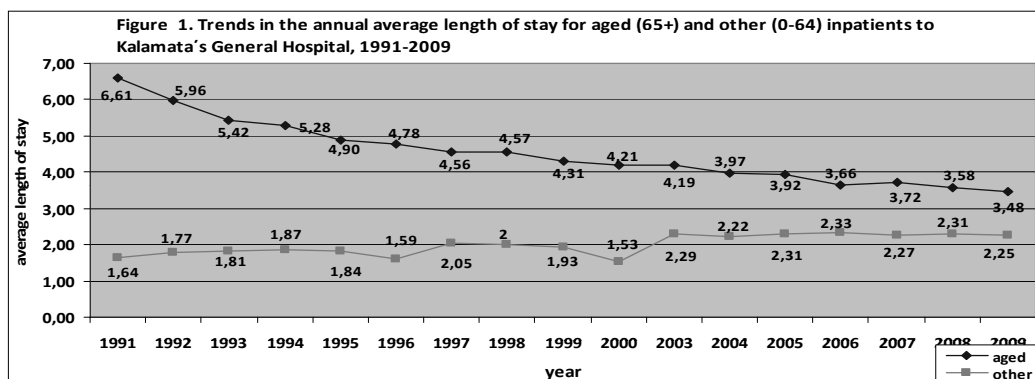
The treatment of such complicated cases gains the features of multiple referrals to clinics and may include inter-departmental medical cooperation. The particularity of the above relies almost exclusively on the quality of coordination and communication between departments and medical personnel and it reflects on the effectiveness of the treatment and on patient



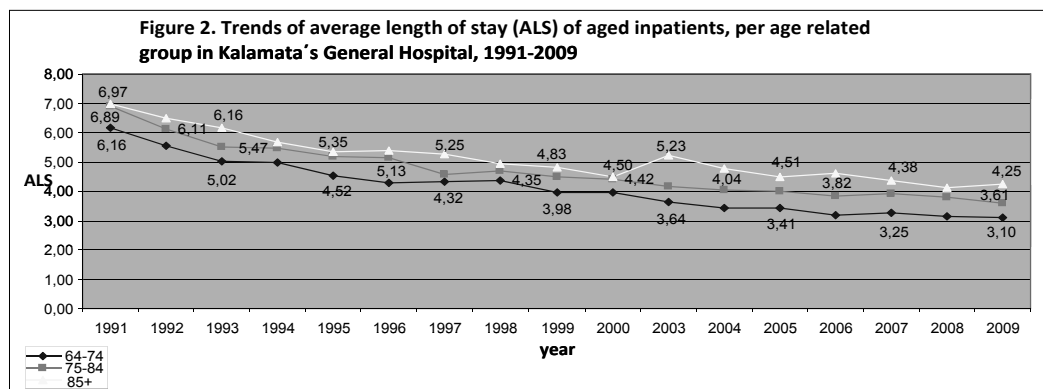
satisfaction, since multi-sector medical care tests the effectiveness of the functions of the hospitals' services and the staff's understanding of the elderly and those accompanying them (quality of cooperation and information level).

### 3.4 Average length of hospital stay of elderly patients

Significant changes are noted in the average length of hospital stay of elderly patients. Analysis of data (fig. 1) show a rapid decline (-40%) in the average length of hospital stay of the elderly during the period 1991-2009 (from 6,6 to 3,97 days). The importance of this change is further reinforced if the fact that for the same chronological period the average hospital stay of younger group ages increased 37% (from 1,64 in 1991 to 2,25 days in 2009) is taken into account. One of the consequences of the above changes is the convergence of the average length of hospital stay of the elderly and the younger since from 4,97 days it decreased to 1,23 days in 2009 (fig. 1).



Equally important is the fact that the decline of the average hospital stay is realized in all the age groups (fig. 2). The fourth age group presents the largest decline (-3.28 days) while the third age (-3,06 days) and the fifth age 9-2,72) follow.



It seems that the main reason of the rapid decline of the average length of hospital stay of the elderly is a shift to short-term hospitalization (figure 3) since admission of elderly patients only for one day are four times more (from 7,7% in 1991 to 34,2% in 2009), whereas long term (7 days +) hospitalization is reduced significantly (from 37,3% in 1991 to 15,8% in 2009).

### 3.5 Annual sum of days spent in hospital by elderly inpatients

Highly significant is the research of data regarding the elderly's annual sum of days spent in hospital in relation to younger age groups. This has a significant impact on the health systems which adopt the method of fixed per diem reimbursement for hospitalization cost, like the Greek NHS, since the alterations in this measurement are directly related to the calculation of hospitalization cost and the corresponding health expenditure which burdens the country's health care system.

Essential alterations can be viewed in the annual sum of days spent in hospital by the elderly admitted at the General Hospital of Kalamata during 1991-2009, in relation to younger age groups.

**Table 6. Annual consumption of "days spent in hospital" by elderly and younger inpatients in Kalamata's General Hospital, 1991-2009**

Year	Annual consumption of "days spent in hospital" by elderly inpatients			Annual consumption of "days spent in hospital" by younger inpatients		
	"days spent in hospital"	annually % of change	Proportion to total	"days spent in hospital"	annually % of change	Proportion to total
1991	32111		68,8 %	14529		31,2 %
1992	32494	1,2%	66,5%	16381	12,8%	33,5%
1993	31138	-4,2%	64,7%	17016	3,9%	35,3%
1994	31912	2,5%	64,9%	17292	1,6%	35,1%
1995	32399	1,5%	65,3%	17210	-0,5%	34,7%
1996	31983	-1,3%	69,1%	14326	-16,8%	30,9%
1997	32499	1,6%	63,4%	18788	31,1%	36,6%
1998	33361	2,7%	63,0%	19590	4,3%	37,0%
1999	32334	-3,1%	61,8%	19995	2,1%	38,2%
2000	34084	3,9%	68,0%	16050	-19,7%	32,0%
2003	45889	34,6%	64,0%	25657	59,9%	36,0%
2004	47846	4,3%	65,0%	25756	0,4%	35,0%
2005	48475	1,3%	63,8%	27480	6,7%	36,2%
2006	47712	-1,6%	62,3%	28904	5,2%	37,7%
2007	51570	8,1%	65,4%	27295	-5,6%	34,6%
2008	49683	-3,7%	64,1%	27773	1,7%	35,9%
2009	48574	-2,2%	63,1 %	28399	2,3%	36,9 %
Average annual change		+ 2,9%	64,9%		+ 5,6%	35,1%

According to the data illustrated in table 6, the average proportion of the increase of the annual sum of days spent in hospital by the elderly (2,9%) is almost half in comparison to that of the younger group ages (5,6%). As a result, there is a gradual decrease of the proportion of participation in the use of annual days spent in hospital by the elderly in the total of the annual sum of days spent in the general hospital of Kalamata during 1991-2009.

## 4. Discussion-conclusions-suggestions

The main focus of the current study is the exploration of the important social issue of whether the elderly add a considerable burden to the increase of hospital care demand using the case of the General Hospital of Kalamata and the elderly population of the prefecture of Messinia.

The results show that the participation of the elderly in the demand for hospital care in the General Hospital of Kalamata is evident. The interest focuses on the fact that the amount of participation depends on the measurement unit of hospital care demand. Thus, the results of the study when using "admission for hospitalization" as a means of measurement, show clearly that the hospital bears a burden owing to the elderly since the period under examination (1991-2009) the number of admissions of elderly tripled (from 4858 to 13958), the percentage of the elderly participation to the total of hospital admissions doubled (from 35,42% to 52,62%) and the elderly consist the primary «client» of the hospital compared to other age groups.(0-64).

The results appear to conflict the above when the "average length of hospital stay" and the "annual sum of days spent in hospital" is used as a means of measurement. Thus, the following points seem to underline in our case the beginning of a re-approach to the issue of the burden added to the hospital system by the elderly:

- a. The sharp decline of the "average length of hospitalization" in 1991-2009 (from 6,61 to 3,97 days) for all age groups, related to the corresponding diachronic increase in the younger age groups (from 1,64 in 1991 to 2,25 days in 2009)
- b. The especially low increase of "annual sum of days spent in hospital" by the elderly (2,9%) in relation to the corresponding increase in the younger age groups 5,6% and
- c. The decrease of the percentage of the elderly's participation in the total of the consumed hospital days (from 68,1% in 1991 to 63,1% in 2009).

The reasons of the decrease of the average length of stay of the elderly, seems to derive from the abrupt increase of elderly inpatients for one day hospitalization (from 7,7% in 1991 to 34,2% in 2009) and the fall of the elderly with long-term hospitalization(7+days), from 37.3% in 1991 to 15,8% in 2009. Essentially, the quantitative analysis of the data indicates that during the period 1991-2009, the burden added to the hospital by the elderly tends to decrease in relation to the increased burden added by younger ages both at the level of hospital stay duration and at the level of the "annual sum of days spent in hospital".

The aforementioned determine the actual dimensions of the issue of the burden put on the local hospital owing to the elderly and the following seem to be the basic qualitative features:

- a. The argument that the elderly in relation to younger age groups create a much larger burden to the hospitalization system weakens (at least for the case of the General Hospital of Kalamata) since during the period under consideration, a rapid convergence of the duration of hospitalization between the elderly and the younger ages is noted (the difference decreased from 4,97 days of hospitalization, in 1991 to 1,23 days of hospitalization in 2009) and a decrease of the percentage of participation in "annual sum of days spent in hospital" compared to younger ages.
- b. The elderly to a large extent use the local hospital for primary health care (one day hospitalization). The conclusion tends to justify the concept of hospitalization of the aged in Greece, not due to the increase of demand but due to the inefficiency of the primary health system to respond to one of its basic functions, the provision of short-term hospitalization or day care hospitalization of the elderly.

- c. A major issue seems to be not the increase of the number of the elderly in the prefecture of Messinia, but the ageing of the elderly, that is the appearance of a new population age group with complex pathological characteristics, which the local hospital care system should deal with effectively. The complex pathology of the elderly inpatients (more than half of the admissions suffer from more than one disease) mark the need of reform of the admissions system and the health care of the elderly. Thus, issues of coordination and communication at the level of medical cooperation will be dealt with and the effectiveness of the treatment and patient satisfaction will be improved.

In conclusion, it seems that population ageing in the prefecture of Messinia does not increase considerably the actual demand for hospital care, since the increase of the number of elderly inpatients is balanced by the gradual decrease of the average hospitalization and the decrease of the "annual sum of days spent in hospital".

In contrast, the major issues which emerge in the current study are the inefficiency of the local primary healthcare system to cover part of this demand confirming thus the phenomenon of hospitalization of the aged and the inadequate systematic treatment at hospital level of complex cases of the elderly.

It appears that, at least for the case of the prefecture of Messinia and the local hospital, the relation between the ageing population and hospital care is a matter of modernization and reformation of the «mix» of the provided health care to the elderly at the local healthcare system. That is, the systematization of the provided primary health services for treatment of primary cases, which at present are treated at the local hospital of Kalamata (36% of the elderly inpatients) and the creation of a geriatrics clinic for the treatment of complex geriatric cases.

Undoubtedly, the results of the present study-case concern the relation of ageing and health care demand at local level. The conclusions can not be generalised. Further research is required with wider population and hospital data, which will cover urban areas and more complex hospital systems (district and university hospitals).

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