Projection of demand for long-term care in an Italian region: a macrosimulation approach

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Abstract

The ageing population is a demographic, social, cultural and an economical issue. To increase the awareness of the implications of this phenomena at a policy level, a macro-simulation approach is developed for an Italian region (Friuli Venezia Giulia).

The population projections at the regional were disaggregated into macro-cells based on sex, age, family composition, living conditions, and the role of informal care by taking into account the complex nature of the phenomena,. National and regional databases were investigated to simulate the 2001-2051 demand of LTC services. The use of long term care services in 2000 was assumed as reference.

Multiple scenarios were developed on the basis of high/low population projections, the relationship between ageing and dependency ratios, and the impact on demand of the availability of informal care.

In the reference scenario (i.e. base case analysis), the population in residential care increased from 2001 until 2051 by 116 %, community services demand was projected to have a greater increase (+148 %) given the higher proportion the population over 80 years old (+153%) and the associated increase in the dependant population (+101).In all the scenarios, the findings suggest an increase in the level of demand for LTC, different set of needs, and higher burden on family and informal networks, impacting the sustainability and appropriateness of the current pattern of care.

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Introduction

Ageing of population is a phenomena with strong social, cultural and economical implications. At political level it assumes relevance in terms of fiscal, social and health policies. The basic object is to identify and meet the needs of the elder population, in particular of the older people with dependency. Intervene on the long term care (LTC) network of care has implications both at social (i.e. availability of unpaid or informal support from family or unqualified personnel), personal (i.e. expectations), health (i.e. dependency), and economical (i.e. unit costs of services) level.

Indeed, ageing should be treated, even at political level, as a multidimensional topic.

It's evident that a growing proportion of elderly people means a growing demand of long-term care assistance.

But which type of assistance is more appropriate?

Is the current pattern of care feasible in the long run?

What needs should be met in the future?

What's the role of informal care in a ageing society?

To give an answer to these questions and to react properly and in time to the ageing challenges, demographic projections are not enough.

Demographic projections and complete data on service demand and offer would allow to forecast the met and unmet needs now and in future. That would be a powerful tool to identify areas in which redefine or improve the network of care. Unfortunately this level of knowledge is just a desiderata and not a reality especially at local (regional) level. In order to exploit current knowledge of reality an alternative solution to forecast is simulating.

In the paper, first the critical elements related to LTC network of care and the demographic development are identify. Following the regional reality investigated is briefly described. Further the simulated model is introduced and its results presented.

A multidimensional approach

It is insufficient to know how many elderly there will be in the future, so it is necessarily to investigate its relation with needs and demand and with the social framework supporting older people.

The demographical development must be investigated also through:

- the caretaker ratio: the ratio of women in the age range 50-64 years to the population over 80 years old. The underlying assumption is that women in this age group are likely to be family

members who will provide informal support to the elderly. The higher the ratio, the greater the chances the elderly will have a family network on which to depend instead of requiring long-term care.

- the age dependency ratio: the ratio of population over 65years old to population in the age range 15-64 years. It is another indicator linked to labour market considerations and to the availability of informal care, even if the type of support within a family varies by age. Working family members in the working age could not only provide informal care but also have the financial resources to pay for private informal care and/or formal one.

- the percentage of women over the total of elderly population. This indicator is relevant given the higher probability of women to provide informal support to family members.

- the ratio of the population over 80years old to over 65 years old.

- the life expectancy. An increase in the life expectancy implies a higher percentage of the elderly people, as well as, a likely increase risk of experiencing some form of dependency in the remaining years of life (4).

Furthermore a wide literature (18,20) has investigated the potential factors associated with demand identifying the main determinants in:

- prevalence of dependant elderly;

- types of dependency in the elderly;

- frailness that could determine express demand of formal service or remained an unexpressed demand met only by informal services;

- availability of informal care. Informal care should be considered as free support offered by family members. Other types of carers also exist. For example, in Friuli Venezia Giulia (FVG), '*badanti'* is often used to describe mainly foreign women who provide home and personal help to the elderly. Local governments are in discussion to recognise and regulate their role given that till now their activities are almost completely negotiated on the black market;

- expectation on the long-term services;

- medical technology;

- service costs.

PRAI Frenesys -E-Welfare Project

The issue of LTC demand in the future was investigated by the "PRAI FReNeSys (Friuli Venezia Giulia Region Network Systems) -E-Welfare Project". It was focused on the LTC system operating

at regional and sub-regional level with the aim of identifying possible evolution in the LTC service provision due to demographic developments.

The regional level investigated here is the one of Friuli Venezia Giulia (FVG) located in the north-east of Italy with an overall population of 1.100.000 in 2000, with around 250.000 people over 65 years (source: FVG Regional Statistical Office).

The PRAI FReNeSys covered different aspects of elderly assistance such as:

- multidimentional functional assessment of elderly status (21). The work focused on Val.Graf, a tool for functional assessment of the elderly at nursing homes or at home derived from the SMAF (Le système de Mesure de l'Autonomie Fonctionnelle) by Herbert (11) and developed by the Italian National Istitute for Health (ISS). **Table 1** summarize the assessment tools adopted at Italian level;

Table 1

- software solutions to manage patients in nursing homes (27);
- investigation of the population frailness and informal services use at regional level (32). It was conduced one of the few observational studies on frail elderly. The study analysed a subregional sample of not institutionalised elderly people resident in a Local Health Unit (ASS 5). At the first stage, GPs provided an evaluation of the status of more than 3000 elderly people focusing on clinical, cognitive, functional, material and social conditions. Then, a sub-sample of about 300 people was evaluated through the home based version of Val.Graf. questionnaire. The aim was to identify the characteristics associate with frailness in order to quantify the unexpressed need.
- alternative solutions for home based assistance (25,29);
- analysis of solution for LTC financing at international level (31);
- organizational analysis of the LTC network of care (23);
- regional planning solutions for the LTC network of care (1,2, 25);
- economical analysis of residential service activity (3);
- finally, the simulation of LTC service demand in future years (30).

FVG Regional population evolution

The FVG Regional Statistical Office provided the 2000 estimates, while the projections at central level were computed till 2051. Individuals over 65 years old were the target population , which represented 252,305 people 2000 year-end. The proportion of females over 80s was the 25.88% .

Table 2

Focusing on demographic projections for the FVG Population, the ageing process is expected to be more and more evident. The population of interest is accounted to increase by 48% (age group 65+). But the population over 80s will boom increasing by +153.5%, while the over 90s will almost triple (+279.5%). This trend is more evident for males.

Table 3

Table 3 suggests the following:
- the burden of assistance will be most evident among women between 50-64 years old. Indeed, the caretaker ratio will decrease from 1.94 per elderly person to 0.56 per elderly person in by 2051. In other words, a caretaker could share the assistance of an elder with a least another family member, while in 2051 a caretaker may be required to assist two elders;
- as a result of a decrease in the caretaker ratio, an increase in the age dependency ratio is likely to happen. The age dependency ratio will double in the next 50 years reaching a value of 0.68. So the economic burden on family members will be increase. As well, it will become more difficult to access the informal and formal network of care, that motivates the measures proposed to support economically the family for LTC service utilization.

Graph 1

- the increase in the proportion of women in the elderly population is another concern (Table 3) since fewer elderly women implies a lower possibility for elderly men to rely on the informal assistance of their wife.
- the life expectancy at 65 years will increase significantly more than the life expectancy at birth.

The ISTAT provides central-high-low demographic projections. We focus on central projections and all the projections were considered in the alternative scenarios of the simulation model.

The long-term care service network in FVG

The PRAI FReNeSys focused on the regional reality of Friuli Venezia Giulia. Graph 2 represents the local network of services, residential and community services (31).

Graph 2

Table 4 provides a brief description of various services offered.

Table 4

Along all the simulation model, this LTC network of care is reproduced. Indeed, the model is adapted to local reality as more as possible.

Data and methods

The macro-simulation model

A literature review reveals the different approaches (9,16-17,23) to model the impact of an ageing population on long-term care (LTC) exploiting simulation tools.

Simulation is based on a set of explicit assumptions and availability of data on the future (10). Both micro and macro simulation models are possible.

In the first one, units of analysis are micro-units or single individuals whose characteristics change according to a behavioural model (26). The efford is to estimate the probability of the events, composing the behavioural model, to occur. Microsimulation models could be dynamic or static. In the field of LTC microsimulation a phenoma often investigated is the lifetime use of nursing homes (16,20)

While in macrosimulation models, the unit of analysis is a group of individual identified by common characteristics. Aggregating variables (or dimensions) are identified on the base of the factors strongly associated with the phenomena under investigation.

The selection micro or macro simulation is based mainly on the availability and quality of data.

To address the issue of long-term care in the future in the FVG Region, a macro-simulation or cell-based model is developed based on a model by the University of Kent-PSSRU (7) and by the European Study on Long-Term Expenditure (6).

The PSSRU long-term care projections model was constructed as part of a project on long-term care finance, which is funded by the Department of Health. The initial model was used to provide projections for the Royal Commission on Long-Term Care in 1999 (7) and it is regularly updated and expanded (8).

In a second moment, the European Commission financed a comparative study of future long-term care expenditure in Germany, Spain, Italy and the UK (6, 8).

The European Study provided an estimate of LTC expenditure in Italy using a very simplified approach, that disaggregates data by age, gender and residential or community services.

The model for Friuli Venezia Giulia differs from the PSSRU experience as follows:

- investigates the simulated evolution of demand for each specific type of residential and community service available at regional level;

- refers to local data exploiting the informative potential of regional and national databases such as:

    - the ISTAT population estimates and projections;

    - the 1999/2000 National Survey on Health Conditions and Demand of Health Services (14);

    - the 1999 National Survey on Health and Social Services (14-15);

    - the Regional Health Information System (SISR- Sistema Informativo Sanitario Regionale);

    - the 2000/2001 Regional Val.Graf. Database.

- exploits the output of other studies part of the overall PRAI FreNeSYs Study. Such as the part related to the network of care, informal care and frailness;

- attempts to address the issue of frail elderly, which is not covered in the PSSRU model. The results of the Frail Elderly Study in FVG (prevalence of frailness) have been standardised to obtain provisional data at regional level. In 2000, the standardised prevalence was 40.06% versus a sample prevalence of 48.68%.

The simulation model is comprised of two levels:

- Level 1: population, where the level and composition of the population is considered;

- Level 2: demand, where the elderly population from level 1 is redistributed among services according to the current pattern to care.

In Level 1 (population), the dimensions investigated in the model are:

Table 5

The dependency dimensions (5) have been modelled as follows:

- to the population not followed by formal services have been applied the dependency distribution that the 1999/2000 National Survey on Health Conditions and Demand of Health Services provides for the regional population. Three levels of dependency (mild, moderate, and severe) were identified based on the survey responses related to disability. Subsequently, the distribution was computed for age ranges and sex.

- the population using community services was assumed to be all dependant in one form or another and where possible the dependency was gauged using data by the Regional Health Information System (SISR). The assumption is that the use of formal domiciliary services is determined by the presence of dependency.

Table 6

- the level of dependency for residential population was categorized according to the types of services referred and on data associated with dependency needs.

Table 7

The Val.Graf. database was used to gauge dependency on the base of the Activities of Daily Living (ADL) dimensions using the PSSRU approach (7).

Our primary source of information on living conditions and family composition was the 1999 National Survey on Health and Social Services. Living conditions, defined as living in house of property or in rented house, was proposed by the PSSRU study as a proxy of the socio-economical status. This information is available from the 1999/2000 National Survey on Health Conditions and Demand of Health Services which refer only to not institutionalised population. The information on

the prior to institutionalisation living conditions is missing. The same problem arise for family composition.

So far these two dimensions, given this problems, have been included only for non- institutionalised population.

For the family composition the National Survey variable on "family nucleus" was adapted to the PSSRU approach making assumptions on the link between living alone or married/cohabiting couple and the potential availability of informal care (22, 28). Making assumptions was preferred to refer to the National Survey variable "civil status" given the logistic regression results. Indeed, a logistic regressions was performed on the presence/absence of dependency, moderate disability and severe disability. Worsening the level of disability, higher resulted the relevance of the information provided by the dimensions "living conditions" and "family composition" and higher is the sensitivity of the regression (ability to detect the presence of the dependency). The logistic regression was performed to confirm the informative potential of this dimensions.

In level 2 (demand), data on the number of people using different types of formal services were collected for the year 2000 by the Regional Health Information System (SIRS) and Regional Health Agency. The sex and age distribution were extrapolated from the Val.Graf. 2000/2001 database.

Table 8

Having chosen a macro-simulation model, the role of assumptions is crucial. Multiple scenarios were investigated making alternative assumptions:

- the reference scenario replicates the 2000 situation, in relative terms, to ISTAT central demographic projections. It gives some hints on how the current network of care would react to the ageing if no change will intercourse on the offer side. No changes are assumed to the type of formal services, any consideration on the real possibility of services to satisfied the demand are exogenous to the model. Implicitly is assumed that the demand is strongly linked to the dimension that define model cells (age, sex, living conditions, and family composition);
- while scenarios #1 and #2 refer to ISTAT high and low demographic projections while holding constant all other dimensions;
- scenarios #3 linked the evolution in the 65 years old life expectancy to the dependency distribution. For each year gained in life expectancy, the dependency distribution is shifted by one year. ISTAT projections forecasts a 1 year increment in 65 year life expectancy in 2008, 2015, 2021 and between 2025-2030;

- in the scenarios #4 the dependency distribution is shifted upward by one year every 2 years of increase in the 65 years old life expectancy;

- scenario #5 a 0.5% per year decline in the proportion of dependant elderly people with informal care is applied. In the reference scenario, all dependent people not referring to any type of service (residential or community care) were assumed to rely on informal care. The decline in the informal care is associated, in this scenario, with an equal increase in those referring to residential care. The assumption is the increasing inability of families to manage the burden of care of older people;

- in the scenario #6 the 0.5% decline in informal care is associated with an increase in community care demand. In this case, families will continue to support the burden of assistance associated to long term care needs but share it with formal services.

Output data for each scenario were:
- residential population distribution by age and sex
- institutionalised population (referring to residential care) distribution by age and sex and type of service
- non-institutionalised population (not referring to any type of residential care) distribution by age and sex and type of service
- dependency distribution by age and sex
- dependency distribution by age and sex and type of service
- frail elderly distribution by age and sex.

Results

The macrosimulation model developed in Excel disaggregating the population into 440 cells in each year from 2000 till 2051. 40 of these cells relate to the institutional population by age (5 bands), gender, previous household type (2 categories) and previous housing tenure (2 categories), and 400 to the household population by age (5 bands), gender, dependency (4 groups), household type/informal care (5 categories) and tenure (2 categories).

The number of dependent older people in Friuli Venezia Giulia was projected to grow from almost 50.000 in 2001 to 91.000 in 2031 and to 110.000 in 2051, with an increase respectively of 68% and 101%.

Without any change to the LTC network of care, the demand for institutionalised services would increased by 78% in 2031 and by 116% in 2051. At the same time, given current prevalence of frailness, frail elderly proportion on 65+ population will increase from 40% to 46% in 2051.

Table 9

Here data for year 2000, 2031 and 2051 is presented, but the model simulates the LTC demand for each single year and for each scenario.

Table 10

The greater increase in the very elderly (scenario #1, + 210.8%), the greater the proportion of dependent people (+143.4) and the greater the demand for community care (+218.1%) will be.. The same scenario will likely occur to the proportion of the frail elderly in 2051 (47% in scenario #1 and 45.4% in scenario #2).

The key role of dependency on service demand is confirmed by scenarios #3 and #4. Indeed, assuming an increment in the number of healthy life years for any improvement in the life expectancy has a strong impact on the share of population who experience dependency, and on the type of needs that should be met by the network of care. Given the model assumptions the type of demand will change, but the level of demand will not change.
Shifting by one year the dependency distribution in each of these years (scenario #3), the dependant population will increase by 67.08% compared with the +101.41% in the reference scenario (Table 11). The moderate dependency will increase by 73.9%, while severe one will increase by 33.80%. In scenario #4, where the shift is applied every second year of improvement in life expectancy, the dependant population will increase by 83.26%, but in this case the higher increment occurs in the severe dependency (+91.20). A different distribution of dependency implies changes to Furthermore, the dependant population not covered by formal or informal assistance would increase by 9.07% in scenario #4, by contrast it would drop by 10.2% in scenario #3.

Table 11

Scenario #5 and #6 assume a different pattern of care redistribution: the 0.5% of dependent elderly without informal care requiring, residential and community care. The effect is not relevant on the level of additional demand.

Discussion

The baseline scenario simulates significant increases in both the dependant population and in the demand. If it is really feasible to the system to increase provision of resident care by 115.6% and community care by 148.40% (Table 9) is a political question that the simulation model wants to arise. The model provokes the policy makers to reflex on sustainability of the current network of care.

The ability to increase provision of beds in nursing homes and other institutional services is strongly controversial. It justifies the need to promote alternative solutions to assist older people at home or in a more familiar contest.

The equilibrium among institutionalised and domiciliary services and families is quite critical.

Given the demographic trends, elaborated by ISTAT and assumed as endogenous in our model, to centre the system of assistance on families members appears difficult. Increasing participation of women to the labour market, cultural and political changes (retirement age, flexibility in working hours), and demographic development (higher age dependency ratio, lower caretaker ratio) are factors to take into consideration in the formulation of incentives to assistance by families. The introduction of incentives to families members appear as the only solution if the instituonalisation is not perceived as the best solution.

Regulation of the informal market must be address as well as different forms of support for families. Current role of paid informal carers should be seriously investigated and managed in order to support it and give it a more professional background.

The recognized support could be financial or in provision of facilities allowing to manage the elderly needs directly at home. In FVG alternative housing solutions are under study.(29).

Strengths

The presented model was a first and significant effort to deal more in depth the impact of ageing on LTC network. From a methodological point of view, compared to other Italian studies conducted to support policies was and is more detailed and complex (24) taking into account different dimensions involved by ageing. Indeed, it is the first effort to make disaggregated estimated of future demand combining data on age, dependency and household composition. We are completely aware that this is just a fist step.

Furthermore, the FVG model is adapted to a regional specific reality and exploits national and regional data available.

Finally, it is part of a wide and coordinated study on LTC, which investigated frailness and informal care as well.

Limits

The FVG simulation model does not resolve the issue of the LTC network of care in the future, but provides an indication on what may happen to the LTC services delivery if necessary changes do not occur in the network of care.

A strong assumption of the model is that all demand are met by supply. Despite the conceptual simplicity of the model, it is able to make evident how both the current formal pattern of care and informal care (i.e. family support) may be insufficient.

Being a simulation model, no forecast is provided. It provides, on the base of a set of assumptions, answers to questions in the form "what if". The need to forecast is high in the field of long term care, but the current data availability for a local reality like Friuli Venezia Giulia Region precludes us from doing so. Simulation remains a valuable tool for evaluating the impact of current trends in the future.

Future developments

Strong political pressure to plan future institutional services (e.g. number of beds available) was the impetus for the FVG macrosimulation model. Greater attention is currently focused on the definition of the number of beds in nursing homes for the medium and long-term care (up to three years). The regional health authority perspective was adopted to investigate the issue using a multiple dimensional approach in the simulation model, that included demographic, social and health needs dimensions.

To estimate the number of beds all the patient flow from the rise of the need of assistance till acceptance to a nursing home will be summarized in a model. The aim is to capture the ability of domiciliary services to contact and respond to needs. The starting assumption is that a great part of use of nursing home use is avoidable.

Conclusions

The ageing of the population will have a relevant effect on the regional long term care network of care. Ageing, needs, institutional services, domiciliary services, family are all factors that the simulation model attempts to combine.

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Table 1. Elderly need assessment tools currently adopted by Italian Regions

Tool	Region	Brief description
Val.Graf. (Graphic Evaluation Tool)	Friuli Venezia Giulia	It's a multidimensional tool. Aspects included are: functionality, cognitivity, economics, sociality, relationship, an so on.
Svama (Multidimensional valuation of elderly)	Veneto	Aspects included are: health; functional and cognitive valuation; social valuation.
S. Os.Ia (Intermediate evaluation)	Lombardia	It's a epidemiological tool that explore some functional indicators
RUG Questionnaire (Resource Utilization Groups)	Marche	It's a selection of the MDS-items for constructing the Italian RUG algorithm

Table 2. Population of the Friuli Venezia Giulia region at the end of year 2000. (Data source: Regional Statistical Office)

Age	Male	Female	Total
0-64	475,152	461,135	936,287
65-69	30,503	36,302	66,805
70-74	26,164	36,372	62,536
75-79	21,260	36,413	57,673
80-84	9,626	19,503	29,129
85-89	6,724	17,449	24,173
90 +	2,323	9,666	11,989
Total	571,752	616,840	1,188,592
Total 65+	96,600	155,705	252,305

Table 3. Percentage variations in the Friuli Venezia Giulia region population compared with 2000 population. (Data source: National Statistical Office)

Age	Male		Female		Total	
	2005	**2051**	**2005**	**2051**	**2005**	**2051**
0-64	-1.3	-29.5	-1.6	-31.2	-1.5	-30.3
65 +	8.5	71.9	3.6	29.3	41.7	48
80 +	22.2	245.3	17.4	116.6	18.8	153.5
90 +	38.4	507.5	23.4	223.8	26.4	279.5

Table 4. A brief description of the long term care formal network of care in Friuli Venezia Giulia

Long Term Care Service	Brief description
Residential care	
Hospital Rehabilitation	Rehabilitation after acute events
Hospice	Structures for terminally ill patients
Residenze Sanitarie Assitenziali (RSA)	Structures for extensive rehabilitation
Casa Alloggio	Nursing home for self sufficient
Casa Albergo	Nursing home for self sufficient
Utenze diversificate	Nursing home for self sufficient and not self-sufficient
Polifunzionale	Nursing home for partial not self-sufficient
Polifunzionale Modulo A	Nursing home for not self-sufficient
Residenze protette	Nursing home for not self-sufficient
Community care	
Servizio Infermieristico Domiciliare (SID)	Formal Home care Services provided by the nurses
Servizio Riabilitativo Domiciliare (SRD)	Formal Home care Services provided by the physiotherapists
Assistenza Domiciliare programmata (ADP)	Home care provided by the GP
Assistenza Programmata Integrata (API)	Home care provided by the GP

Table 5. Dimensions used to define cells in the simulation model

Institutionalized population	Non-institutionalized population
Age	Age
Sex	Sex
Dependency level	Dependency level
Living condition	
Family composition	

Table 6. Levels of dependency among the population assisted by community care

Community service	Dependant (Yes/No)	Graduation of dependency
Servizio Infermieristico Domiciliare (SID)	Yes	Complex need = severe dependency Simple need= moderate dependency
Servizio Riabilitativo Domiciliare (SRD)	Yes	Outpatient need= mild dependency
Assistenza Domiciliare programmata (ADP)	Yes	No levels of dependency: all dependent
Assistenza Programmata Integrata (API)	Yes	No levels of dependency: all dependent

Table 7. Levels of dependency among the population in residential care

Residential service	Dependency level	Based on
Hospital Rehabilitation	All with moderate dependency	Assumption
Hospice	All with severe dependency	Assumption
Residenze Sanitarie Assistenziali (RSA)	All with moderate dependency	Assumption
Casa Alloggio	Dependant and no-dependant	Val.Graf. 2000/2001 Regional Database
Casa Albergo	Dependant and no	
Utenze diversificate	Dependant and no	
Polifunzionale	Dependant and no	
Polifunzionale Modulo A	All with moderate dependency	Assumption
Residenze protette	Dependant and no-dependant pendant and not	Val.Graf. 2000/2001 Regional Database

Table 8. Proportion of M/F population (over 65 years old) in FVG in residential care or using community services in 2000.

Residential care	Male	Female	Total
Hospital Rehabilitation	621	1,129	1,750
Hospice	149	96	245
Residenze Sanitarie Assistenziali (RSA)	2,015	4,016	6,616
Casa Alloggio	34	44	78
Casa Albergo	225	863	1,088
Utenze diversificate	759	2,950	3,709
Polifunzionale	206	1,285	1,491
Polifunzionale Modulo A	53	362	415
Residenze protette	288	1,081	1,369
Total Residential care	4,350	11,826	16,761
Community care			
Servizio Infermieristico Domiciliare (SID)	2,912	4,833	7,745
Servizio Riabilitativo Domiciliare (SRD)	254	486	740
Assistenza Domiciliare programmata (ADP)	2,649	6,829	9,478
Assistenza Programmata Integrata (API)	698	1,170	1,868
Total Community care	6,513	13,318	19,831

Table 9. Reference scenario results in macrosimulation

	2001	2031	% variation 2001-2031	2051	% variation 2001-2051
Population 65+	252,667	357,907	41.65	373,858	47.96
Population 80+	65,519	134,413	100.57	166,083	153.49
Dependent 65+	54,314	90,771	67.98	109,392	101.41
Residential care	16,799	28,717	77.87	36,217	115.60
Community care	19,890	39,747	99.84	49,405	148.40
% frail elderly	40.00	42,01		46.38	
Hospital Rehabilitation	1,752	2,475	41.22	2686	53.28
Hospice	246	386	57.10	459	86.89
Residenze Sanitarie Assistenziali (RSA)	6,632	11,653	75.71	14,146	113.30
Casa Alloggio	78	143	85.38	179	128.62
Casa Albergo	1,091	1,858	78.89	2,384	118.64
Utenze diversificate	3,717	6,788	86.70	8,511	128.94
Polifunzionale	1,494	2,607	94.62	3,621	142.35
Polifunzionale Modulo A	416	817	96.33	1,018	144.72
Residenze protette	1,372	1,991	89.82	3,213	134.14
Servizio Infermieristico Domiciliare (SID)	7,772	17,285	122.42	21,851	181.16
Servizio Riabilitativo Domiciliare (SRD)	742	1,221	64.67	1,445	94.83
Assistenza Domiciliare programmata (ADP)	9,503	17,852	87.85	22,012	131.62
Assistenza Programmata Integrata (API)	1,873	3,389	80.92	4,098	118.79

**Table 10. Scenarios # 1 and # 2: main results. Percentage variations**

	% variation 2001-2031		% variation 2001-2051	
	Scenario #1	**Scenario #2**	**Scenario #1**	**Scenario #2**
Population 65+	53.28	29.49	70.88	26.01
Population 80+	131.01	69.68	210.77	98.88
Dependent 65+	90.06	45.38	143.39	61.36
Residential care	104.70	50.97	167.04	67.91
Community care	135.36	65.36	218.08	86.33
% frail elderly	2.59	1.07	7.04	5.44

Table 11. Scenarios # 3 and # 4: dependency evolution.

Dependency	% variation 2001-2031			% variation 2001-2051		
	Scenario #0*	Scenario #3	Scenario #4	Scenario #0	Scenario #3	Scenario #4
Mild	50.05	25.20	36.80	50.05	44.32	57.73
Moderate	65.73	47.32	55.81	93.44	73.89	83.39
Severe	76.35	37.89	55.36	117.08	33.80	91.20
Total	68.34	39.21	52.63	101.82	67.08	83.26

* Reference scenario

Graph 1. Caretaker ratio and Aged dependency ratio between 2001-2051 in Friuli Venezia
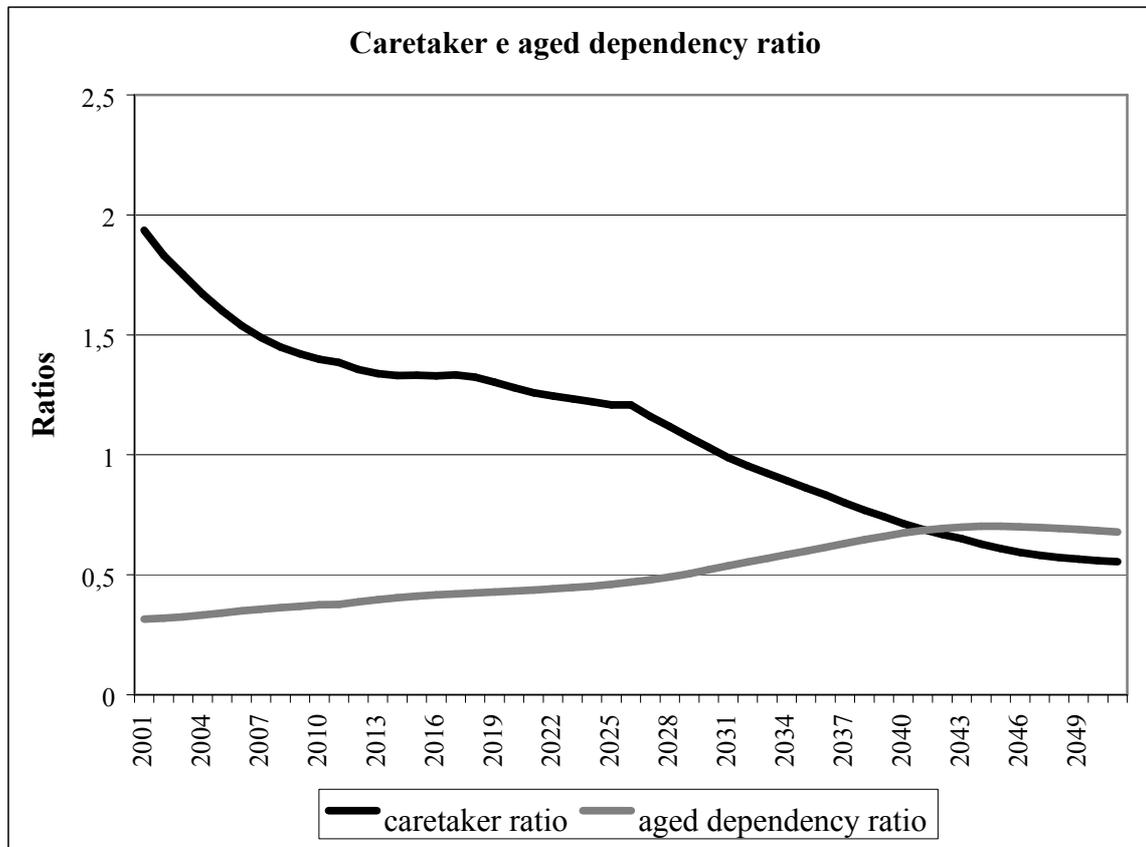
Graph 2. Friuli Venezia Giulia current network of formal long-term care
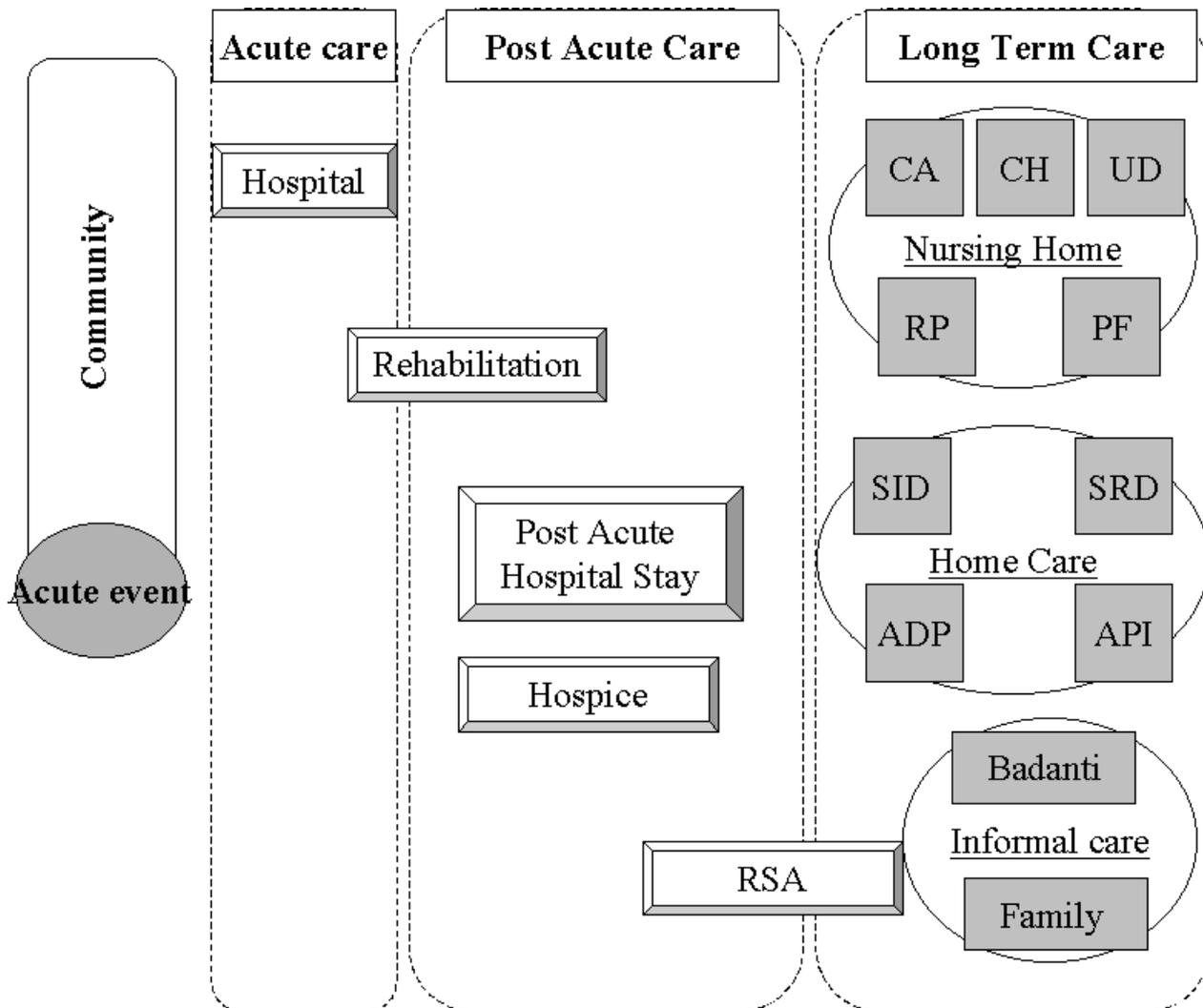
RSA: Residenze Sanitarie Assistenziali

RP: Residenze Protette

PF: Polifunzionali

UD: Utenze diversificate

CA: Casa albergo

CH: Casa albergo

SID: Servizio Infermieristico Domiciliare

SRD: Servizio Riabilitativo Domiciliare

ADP: Assistenza Domiciliare programmata

API: Assistenza Programmata Integrata