Universality, Equality and Equity in the Italian National Health Service: highlighting discrimination phenomena in accessing health services using institutional and administrative data[1]

Silvia Gatti[2]

Università di Bologna (Italy)

1. Introduction

The Italian NHS must guarantee to all citizens, in conditions of equality, universal access to the equitable provision of health services.

In the current institutional framework of healthcare federalism, the central government has the responsibility to ensure these rights through a strong system of guarantees summarized in the Essential Levels of Care (LEAs), and at the same time the Regional Authorities have direct responsibility through their Local Health Authorities (AUSLs) for the implementation of government and expenditure for achieving the country's health objectives.

The monitoring of the LEA by the Ministry of Health (data available since 2001) it would be the tool for verification of the maintenance of the NHS principles, avoiding discrimination in accessing health services. It is an ex post instrument with indicators that do not specifically address each policy of reorganization of services or spending containment. But it is the only complete tool available to everyone and it is possible to read the regional indicators, highlighting the phenomena of non-access to NHS services, the groups that are affected, and the changes over time.

More in depth concerning the progressive changes in the offer of services for the early detection of breast cancer in the area of Bologna AUSL (poster at AEA Meeting 2017: Gatti, 2017)), the data (2002-2016) from the Regional Health Service of Emilia-Romagna on the access to the mammographic services in the AUSLs of the region allow to present the results of a longitudinal analysis on the different paths for the early detection of breast cancer undertaken by the women in Bologna and in the other AUSLs in Emilia-Romagna after the solutions adopted after 2010 to deal with the problems of waiting lists and the control of spending for the services of early detection of breast cancer, redirecting the services toward the screening of public health.

I present two ways to achieve information on discrimination in accessing health services in the Italian NHS: a) analyzing the data of the monitoring of the Essential Levels of Care, b) reconstructing the access choices from the administrative data of the regional health services.

2. Highlighting discrimination in accessing health services using institutional data

I present here a reflection on the phenomena of non-access to NHS services and on the groups that are affected from the results of the monitoring of the Essential Level of Care (LEA) in each Italian region made

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[2] Silvia Gatti, Università di Bologna, Email: silvia.gatti@unibo.it, website: https://www.unibo.it/sitoweb/silvia.gatti, Phone: + 39 051 2098198

by the Ministry of Health for the year 2017 and published in February 2019 (Ministero della Salute – Direzione Generale della Programmazione Sanitaria, Ufficio VI,2019).

In the 19 regions and 2 autonomous provinces data was collected related to 21 indicators with the aim of knowing the provision of the Essential Levels of Care on the national territory and highlighting any critical issues[3].

In 2017 the most critical issues were for the indicators "1.2 Vaccination coverage in children at 24 months for one dose of MMR vaccine against measles, mumps, and rubella", "1.3 Vaccination coverage for influenza in the elderly (≥ 65 years)" , "9.2 Number of beds for the care of the elderly ≥ 65 years of age in residential structures for 1,000 resident senior citizens"and "18.1.2 Percentage of primary Caesarian sections in maternity department of level I or anyway with <1000 births".

These critical issues are related to specific groups: 1.2 children under 5 years of age, 1.3 elderly over 65, 9.2 elderly over 65, 18.1.2 mothers and newborns.

The regions and autonomous provinces reported in purple and red are the most critical point. In purple we have the regions that are improving the indicator, but they have a strong deviation from the health protection objective. In red we have the regions that are in strong deviation and are not improving and therefore they maintain or aggravate the discrimination/ disengagement in the protection of health for mothers, newborns, children under 5, and the elderly. In fact the other indicators of the monitoring of the LEAs, many of which concerning the population as a whole, more frequently reach or come closer, progressively improving, the set objectives.

For the LEA indicator closest to the themes of changes in the early detection of breast cancer "2. Proportion of persons who underwent a first-level screening test, in an organized program, for cervical, breast, and colorectal cancers" the results are extremely divergent between North and South Italy. The North appears to be fulfilling and the South presents a deviation from its objectives not acceptable. It should be noted that the indicator should be disaggregated to better understand the situation of the three types of screening programs and that an indicator should be added in the Care level "District, specialist" concerning the timing of the delivery of mammograms as is done for magnetic resonance exams with the indicator "13. Number of outpatient specialist magnetic resonance exams given per 100 residents".

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[3] The complete set of indicators for the monitoring of the Essential Levels of Care for the year 2017 is presented in Appendix 1.

1.2 Vaccination coverage in children at 24 months for one dose of MMR vaccine against measles, mumps, and rubella

Regione	2015	2016	2017
Piemonte	88,7	91,1	94,7
Valle d'Aosta	88,1	83,1	90,3
Lombardia	90,3	93,3	93,9
P.A. Bolzano	68,8	67,5	71,8
P.A. Trento	84,5	87,3	91,6
Veneto	87,1	89,1	92,3
Friuli Venezia Giulia	81,9	83,2	86,5
Liguria	81,4	82,1	90,8
Emilia-Romagna	87,1	87,4	93,4
Toscana	88,7	89,3	93,5
Umbria	87,5	89,4	94,5
Marche	79,9	83,0	88,2
Lazio	84,5	87,9	95,3
Abruzzo	84,2	87,6	89,2
Molise	77,4	73,5	90,5
Campania	80,8	83,8	92,0
Puglia	84,2	85,9	91,1
Basilicata	90,3	90,6	92,9
Calabria	84,2	86,5	92,8
Sicilia	79,2	81,1	85,6
Sardegna	87,7	90,3	93,0

Indicatore 1.2 - Anno 2017

Valore normale 9	Scostamento minimo 6	Scostamento rilevante ma in miglioramento 3	Scostamento non accettabile 0
>= 95,0 %	92 %- 94,9 %	< 92,0 % e in aumento	< 92,0 % e non in aumento

1.3 Vaccination coverage for influenza in the elderly (≥ 65 years)

Regione	2015	2016	2017
Piemonte	46,9	48,2	47,9
Valle d'Aosta	42,2	44,4	44,1
Lombardia	47,7	47,5	47,7
P.A. Bolzano	37,8	37,3	35,3
P.A. Trento	50,2	53,2	53,5
Veneto	54,0	55,8	55,1
Friuli Venezia Giulia	51,1	54,1	55,7
Liguria	45,7	47,3	50,1
Emilia-Romagna	51,9	52,7	53,3
Toscana	52,2	54,8	55,3
Umbria	62,8	63,1	63,4
Marche	50,1	51,0	50,0
Lazio	51,0	51,5	51,8
Abruzzo	45,7	48,6	49,1
Molise	43,8	52,4	61,0
Campania	52,8	56,7	57,4
Puglia	50,8	57,4	59,4
Basilicata	47,9	49,8	53,2
Calabria	51,7	57,9	61,2
Sicilia	49,5	52,9	54,3
Sardegna	40,0	41,6	44,0

Indicatore 1.3 - Anno 2017

Valore normale 9	Scostamento minimo 6	Scostamento rilevante ma in miglioramento 3	Scostamento non accettabile 0
>=75%	60% - 74,9%	<60% e in aumento	<60% e non in aumento

9.2 Number of beds for care to the elderly ≥ 65 years of age in residential structures per 1,000 resident senior citizens

Regione	2015	2016	2017
Piemonte	25,85	26,06	27,04
Valle d'Aosta	0,35	0,34	-
Lombardia	27,08	26,64	26,78
P.A. Bolzano	38,01	38,03	43,02
P.A. Trento	40,76	40,20	40,02
Veneto	28,13	28,00	27,71
Friuli Venezia Giulia	24,83	24,32	24,97
Liguria	14,51	14,49	14,61
Emilia-Romagna	15,93	15,75	15,57
Toscana	12,62	12,46	13,38
Umbria	10,18	10,32	10,46
Marche	11,41	12,02	14,15
Lazio	5,75	5,44	5,98
Abruzzo	5,66	5,70	5,60
Molise	0,55	0,57	0,81
Campania	1,25	1,37	1,38
Puglia	5,71	5,03	5,16
Basilicata	1,31	1,38	1,98
Calabria	6,22	5,62	5,91
Sicilia	1,49	1,47	1,41
Sardegna	2,04	2,17	2,21

Indicatore 9.2 - Anno 2017

Valore normale 9	Scostamento minimo 6	Scostamento rilevante ma in miglioramento 3	Scostamento non accettabile 0	Validità del dato -1
>=10	6 – 9,9	< 6 e in aumento	< 6 e non in aumento	Flusso insufficiente per qualità e/o copertura

2. Proportion of persons who underwent a first-level screening test, in an organized program, for cervical, breast, and colorectal cancers

Regione	2015	2016	2017
Piemonte	7,0	11,0	11,0
Valle d'Aosta	15,0	15,0	15,0
Lombardia	11,0	9,0	9,0
P.A. Bolzano	9,0	9,0	9,0
P.A. Trento	13,0	13,0	15,0
Veneto	15,0	15,0	15,0
Friuli Venezia Giulia	15,0	15,0	15,0
Liguria	9,0	9,0	9,0
Emilia-Romagna	15,0	15,0	15,0
Toscana	13,0	13,0	13,0
Umbria	13,0	13,0	11,0
Marche	9,0	9,0	9,0
Lazio	5,0	7,0	9,0
Abruzzo	7,0	9,0	9,0
Molise	7,0	7,0	9,0
Campania	3,0	3,0	3,0
Puglia	2,0	2,0	4,0
Basilicata	11,0	9,0	9,0
Calabria	1,0	2,0	2,0
Sicilia	3,0	3,0	3,0
Sardegna	5,0	5,0	3,0

Indicatore 2 - Anno 2017

Valore normale 9	Scostamento minimo 6	Scostamento rilevante ma in miglioramento 3	Scostamento non accettabile 0
Score >=9	Score 7 - 8	Score 5 - 6	Score 0 – 4

3. Highlighting discrimination in accessing health services using administrative data

In this second part, I present an evaluation of the possible effects of discrimination deriving from reorganization measures of the services of early detection of breast cancer that have led in Emilia-Romagna since 2010, and in Bologna in particular, to redirecting the services toward the screening of public health (poster at AEA Meeting 2017). In this case the approach used is the one presented as a last possibility for the citizen to protect himself by appealing to the new rules of transparency for the Public Administrations (Legislative Decree 33/2013 and Legislative Decree 97/2016) and to the commitment of the National Anti-corruption Authority in the poster at AEA Meeting 2018.

As a citizen it was possible, according to these new transparency rules, to request and obtain the data (2002-2016) from the Regional Health Service of Emilia-Romagna on the access to the mammographic services in the AUSLs of the region, therefore to be able to do a personal assessment of different paths for the early detection of breast cancer undertaken by the women in Bologna and in the other AUSLs in the Emilia-Romagna after the solutions adopted after 2010 to deal with the problems of waiting lists and the control of spending for the services. Now I am able to evaluate the repercussions suffered by women with regards to this provision and if these repercussions can be traced to a phenomenon of discrimination, taking into account that the right to access mammogram as an outpatient specialist service remains (poster at AEA Meeting 2017: Gatti, 2017).

4. Methods and Materials

From the ASA database (Assistenza Specialistica Ambulatoriale - Outpatient Specialized Assistance) the bilateral mammographic services related to women resident in Emilia Romagna who carried out the service in an Emilia Romagna facility under the Italian NHS regime were extracted.

In the received file (about 5,000,000 bilateral mammographic service records) the following fields are present: YEAR: identifies the year in which the service was performed; COD_AZI: identifies the Local Health Authority of territorial location of the supplying structure; COD_STR1: identifies the code of the supplying structure through STS11 coding; COD_STR: identifies the code of the supplying structure and the name at 2016 (not all the structures of past years have a name, for example the structures closed, which is why the code was also given); USL_RES: identifies the Local Health Authorities (AUSL) of residence of the client; ID_PAZ: numerically identifies a patient; PRESTAZ: identifies the code and the name of the bilateral mammogram; DT_EROG: identifies the delivery date; ETA: identifies the age of the patient at the time the service is provided; Screen: s for services performed in screening, n for services performed in another way.

The ASA database has existed since 2002 and entered into force after 2005. The year 2016 was delivered not yet complete because there is no the last data sending.

The statistical methodology adopted for the analysis was the Multiple Correspondence Analysis (MCA), a multivariate exploratory statistical analysis technique aimed at analyzing the existence of association patterns between qualitative variables. The processing was done with the SAS statistical software and the variables taken into consideration for each patient were: screening (Yes or No) patient_ age, description_usl_residence (8 AUSLs of residence in the Emilia-Romagna region); where anno_mammografia has been chosen from time to time as 2002, 2010 and 2016 and eta_paziente has been considered between 45 and 74 (we have delimited the analysis to women potentially involved in population screening and therefore those between 45 and 74 years).

5. Results

The results of the application of the MCA[4] to the data on the provision of bilateral mammograms, in screening or not in screening, by the Regional Health Service show an inertia explained for the first three axes not very high (2002: 10.42%; 2010 : 9.40%; 2016: 10.20%), but certainly allow to clearly outline the evolution of the choices of women of the different AUSLs of the region over the 15 years, of which the database provides us information. In particular they allow to outline the changes in the choices after 2010, the year preceding the heavy changes of the new regional strategy for improving access to outpatient specialist services, in the application of Regional Council Decree 1532/2006, "Regional plan for the reduction of waiting lists". The plan includes measures designed to reduce waiting lists for mammographic exams, while the rules for scheduled access (screening programs) and spontaneous access to mammograms were changed.

Here I present the results of the MCA through the graphs relating to the first two axes produced for the years 2002 (first year available for the database), 2010 (year preceding the heavy changes in the policies for access to the early detection of breast cancer) and 2016 (which, although lacking of the latest data, allows us to fully understand the changes in women's choices).

The first axis in comparison with the second in 2002 is absolutely prevalent in explaining the total inertia (4.65% against 2.93%). In 2010 less (3.45% against 3.01%). In 2016, the first axis is still clearly prevalent (4.34% against 2.96%)

In 2002, the first axis is characterized in the positive semi-axis by the association between NO screening and Modena and therefore with the years prior to the 50 and following the 70 (because until 2010 the mammographic screening program was open only from 50 to 69 years), and then by the Si screening and Romagna association in the negative semi-axis. In the second axis the strong association is between Reggio Emilia and 50 years in the negative semi-axis, followed by the association between Romagna and 70 years in the positive semi-axis.

In 2010 the first axis is characterized by the strong association between NO screening and Bologna in the positive semi-axis and then by the SI screening with Reggio Emilia and Piacenza in the negative semi-axis. In the second axis the strong association is between Modena and the 57 and 59 years in the positive semi-axis and in the negative semi-axis the association is between Reggio Emilia and Piacenza and the years 49 and then 46, 48 and 47.

In 2016 things change radically. In the first axis the strong association is in the positive semi-axis between NO screening and Piacenza, firstly, and then Parma and therefore in the negative semi-axis the association is between SI screening and 46 years and then Reggio Emilia and Romagna. In the second axis the strong association is between Reggio Emilia and 50 years in the negative semi-axis, then in the positive semi-axis the association is between Ferrara and 51 years.

Over the years, the No screening choice has changed from being the relatively standard choice with a contribution to the inertia of the first axis of 11.69% against a contribution of 28.95% of the SI screening in 2002, to be already in 2010 the choice that distinguishes with 34.40% contribution to the first axis against

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[4] A complete presentation of the results (decomposition of the inertia, partial contributions to inertia) of this application of the Multiple Correspondence Analysis is provided in the tables of Appendix 2.

15.84% of SI screening. In 2016, NO screening is the exception choice with 40.13% of contribution to the first axis compared to 9.28% of SI screening.
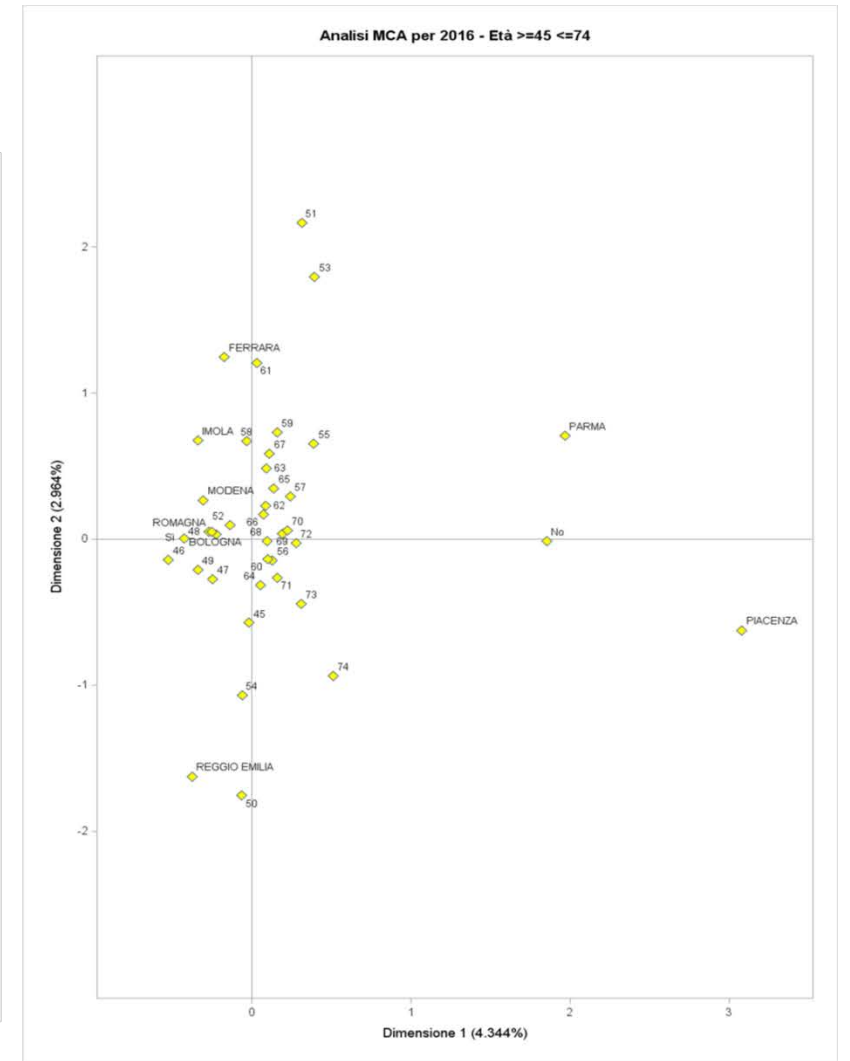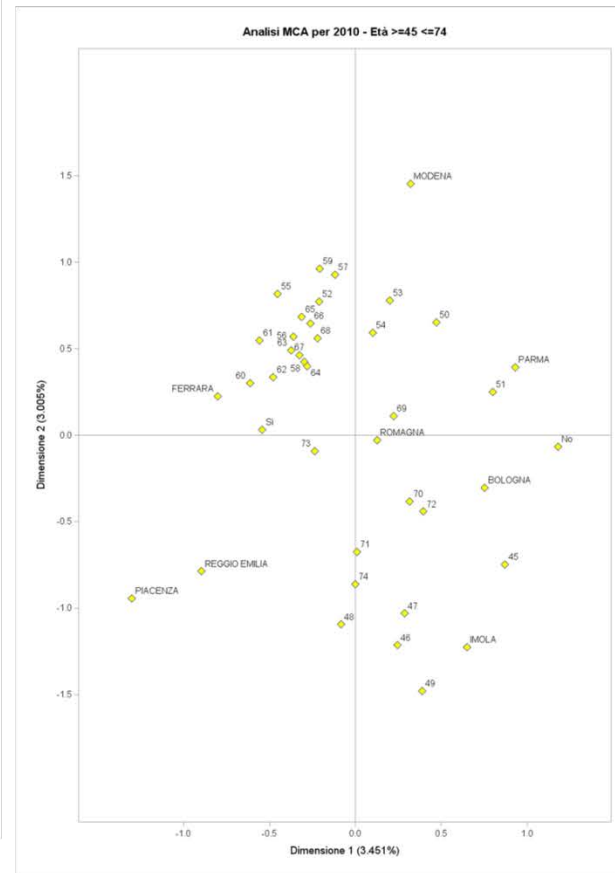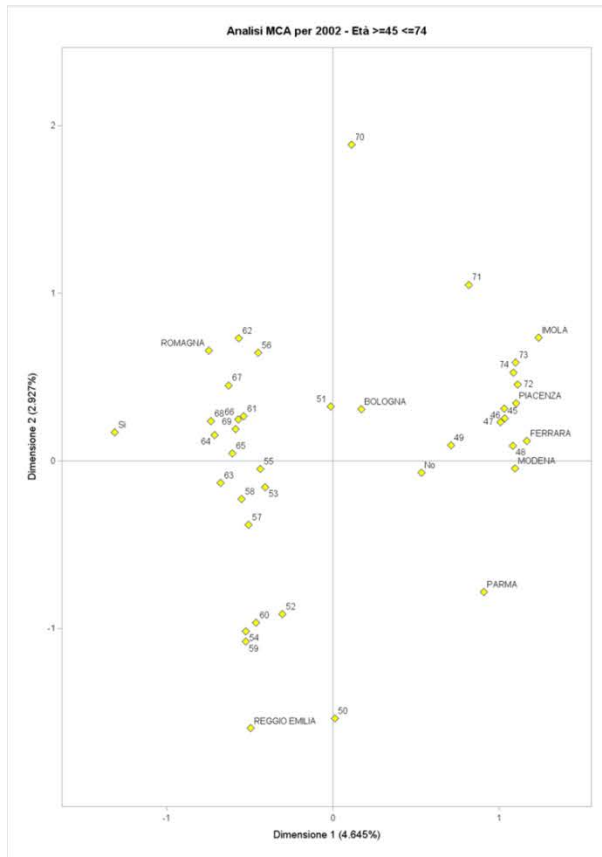
In this context we can try to identify the evolution of early detection for breast cancer choices in Bologna. In 2002, Bologna was associated with NO screening, although not as strongly as other AUSLs in the region. In 2010, Bologna is strongly associated with NO screening. In 2016, Bologna is associated with SI screening, although not as strongly as other AUSLs in the region. Bologna and the SI screening are positioned close together and at the intersection of the axes. In short, in the position of undifferentiation and are surrounded by women of the younger age who have not known within the Regional Health Service the reality of early detection individually managed and with the presence of the breast pathologist, and probably do not have the complete awareness that it is still their right to access the mammographic services via spontaneous access with the prescription of their general practitioner with the presence of the breast pathologist (Gatti, 2017).

It seems that older women have not completely abandoned the spontaneous access to mammographic services via the general practitioner's prescription.

Some AUSLs (Parma and Piacenza) are still characterized by spontaneous access to mammographic services via the general practitioner's prescription.

The study of the third axis can provide more information about the peculiarities of the Bologna "case" in particular for the years 2002 and 2016.

The PASSI epidemiological surveillance survey of the 2019 on the breast cancer screening in the Emilia-Romagna region underlines how in recent years the acceptance of women to pass to population screening, abandoning the individual path of spontaneous access, is justified by economic difficulties and sometimes even population screening is abandoned due to the decline in Emilia-Romagna and in the North of the practice of the advices from doctors and health professionals in general, "which are one of the ways to erode the coverage gap". The population screening is abandoned also due to the non-arrival of the invitation letter (Carrozzi, 2019). Some of these effects were predicted in Gatti, 2017.

Analisi MCA per 2002 - Età >=45 <=74

Analisi MCA per 2010 - Età >=45 <=74

Analisi MCA per 2016 - Età >=45 <=74

6. Conclusions

Traditional tools for the monitoring of the Essential Levels of Care (LEA) and new tools, such as the access to documents according to the 2013 law on administrative transparency which gives individuals a new role of control, have highlighted differences in behavior or recognition of rights regards to certain groups within the National Health Service and specifically in the provision of services for the early detection of breast cancer in Bologna. Both the monitoring of the LEAs and the access to the documents have a sanction implication. In the first case it is implemented directly by the State, in the second case it is implemented by citizens or citizens' associations. The process in the case of Essential Levels of Care is probably more linear and tested. For single citizens or new associations there may be a path to report cases of discrimination to mixed consultative committees of the AUSLs or they can recourse to judicial channels. Again the presence of a supplementary guarantee instrument, such as an independent regulatory agency to safeguard the fundamental principles of Universality, Equality and Equity of the National Health Service in Italy, could be for citizens who want to report cases of discrimination a safe and more agile Institution of reference.

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December 29, 2019

TABLE A1.1 - Essential Levels of Care - Definition of the set of indicators of the year 2017

No.	Care level	Definition	Meaning
1	Prevention	**1.1 Vaccination coverage in children at 24 months for basic cycle (3 doses) (polio, diphtheria, tetanus, hepatitis B, whooping cough, Hib)** **1.2 Vaccination coverage in children at 24 months for one dose of MMR vaccine against measles, mumps, and rubella** **1.3 Vaccination coverage for influenza in the elderly (≥ 65 years)**	*Main indicator for verification of the prevention activity for infective diseases on the population. The indicator distinguishes among the basic cycle vaccinations (3 doses), one MMR (measles, mumps rubella in childhood) vaccine, and influenza vaccine in the elderly.*
2	Prevention	**2. Proportion of persons who underwent a first-level screening test, in an organized program, for cervical, breast, and colorectal cancers**	*The objective of the indicator is to describe the activities of the organized screening programs and the adherence thereto by the eligible population. The intention is to provide an overall evaluation of the compliance with the "LEA" (Essential Care Levels) for all three screening programs.*
3	Prevention	**3.2 Composite lifestyle indicator**	*The indicator describes the respective changes, over time, of the prevalence of individuals with certain behaviors or lifestyles, as proxies of the outcome of the prevention and promotion of healthy lifestyles implemented by the Regions.*
4	Prevention, Protection in workplaces	**4. Percentage of units monitored out of the total to be monitored**	*Indicator established in the Pact for Health and Safety in the Workplace (Prime Minister's Decree of 17/12/2007), which reflects the monitoring activities carried out by the services of the ASL (Local Health Authority)Prevention Department for the protection of health in the workplace.*
5	Prevention, Animal health	**5.1 ANIMAL DISEASES TRANSMITTABLE TO HUMANS – percentage of breeding farms checked for bovine TB and trend of prevalence** **5.2 ANIMAL DISEASES TRANSMITTABLE TO HUMANS – percentage of breeding farms checked for ovine, caprine, bovine, and buffalo BRUCELLOSIS and, for the regions specified in the Ministerial Decree of 14/12/2006 et seq., the compliance with the rechecking times and with the times for reporting on the lab results in at least 80% of the cases, as well as the reduction of the prevalence in all the species** **5.3 ANIMAL REGISTRY – Checks on the animal population for animal and human health prevention: percentage of sheep and goat farms checked for the ovicaprine registry compared to the 3% envisaged by EC Regulation 1505/06**	*The indicators measure several animal health aspects that have a major impact on the health of citizens, with the aim of a direct and indirect monitoring of zoonoses and of a traceability of food-producing animals.*
6	Prevention, Food safety	**6.1 CONTAMINANTS IN FOODS OF ANIMAL ORIGIN – implementation of the National Plan for the Search for Residues ("PNR") of drugs, illegal substances, and contaminants in food products and their residues in foods of animal origin: percentage of the samples analyzed out of the total planned samples**	*The indicator measures the percentage of implementation by the regional governments of the National Plan for the search for residues of drugs and contaminants in foods of animal origin – Legislative Decree no. 158/06.*
		6.2 HEALTH CHECKS CONDUCTED ON THE PREMISES OF FOOD SELLING AND SERVING ACTIVITIES: sum of the values of the percentages of inspections of places (public and collective) that serve food, and sampling conducted at places (public and collective) that sell and serve food, out of the total of those planned, Articles 5 and 6 of the Presidential Decree of 14/07/95	*The indicator measures the percentages of the inspections and samplings conducted in places selling and serving food, compared to those envisaged by Articles 5 and 6 of the Presidential Decree of 14/07/95 (elements deducible by means of "form" A of the Ministerial Decree of 08/10/98), for the monitoring of the proper handling and storage of foods by said food sector operators.*
		6.3 CONTAMINANTS IN FOODS OF VEGETABLE ORIGIN – program for the search of plant protection product residues in foods of plant origin (Tables 1 and 2 of the Ministerial Decree of 23/12/1992); percentage of the samples envisaged whose results are made available for forwarding to the EFSA	*The indicator measures the percentage of implementation of the national program for monitoring residues of plant protection products (commonly called "pesticides") in foods of plant origin – fruit, vegetables, grains, oil, and wine – and the proper coverage for each category,*
7	District	**7.1 Standardized hospitalization rate (per 100,000 inhabitants) in the pediatric age group (< 18 years) for: asthma and gastroenteritis** **7.2 Standardized hospitalization rate (per 100,000 inhabitants) in the adult age group (≥ 18 years) for: complications (short- and long-term for diabetes), OCBP, and heart failure**	*Indirect hospital indicators that assess the ineffectiveness of the prevention and specialist services devoted to the treatment of certain pathologies, in the pediatric and adult age groups, respectively.*
8	District, elderly	**8. Percentage of elderly ≥ 65 years of age treated with integrated homecare**	*The indicator, calculated on the resident population over the age of 65, measures the*

			taking charge of the elderly population by the integrated homecare services of the ASLs (Local Health Authorities). It takes into account the different organizational methods present in the Italian regions.
9	District, elderly	**9.1 Number of equivalent beds for care to the elderly ≥ 65 years of age in residential structures per 1,000 resident senior citizens**	*The indicators assess both the quantity of equivalent beds (on the basis of the days of care provided) and of actual beds (supply network) available in the territorial residential structures with respect to the resident elderly population, and may be considered an indicator of the supply of residential territorial care.*
		9.2 Number of beds for care to the elderly ≥ 65 years of age in residential structures per 1,000 resident senior citizens	
10	District, disabled	**10.1.1 Number of residential equivalent beds in structures that provide care to the disabled per 1,000 residents**	*The indicators assess both the quantity of equivalent beds (on the basis of the days of care provided) and of actual beds (supply network) available in the residential and semi-residential structures that provide care to the disabled, with respect to the resident population, and may be considered an indicator of the supply of residential and semi-residential territorial care.*
		10.1.2 Number of semi-residential equivalent beds in structures that provide care to the disabled per 1,000 residents	
		10.2.1 Number of beds in residential structures that provide care to the disabled per 1,000 residents	
		10.2.2 Number of beds in semi-residential structures that provide care to the disabled per 1,000 residents	
11	District, terminally ill	**11. Existing hospice beds compared to the total number of deaths from tumors (per 100)**	*Indicator of the supply for residential care of terminal patients. It is in relation to the population that prevalently needs such care.*
12	District, pharmaceutical	**12. Percentage of annual consumption (expressed in DDD (Defined Daily Dose) of the drugs belonging to the PHT**	*The indicator makes it possible to measure the direct taking charge of assisted patients characterized by critical diagnoses and treatments and by the need for a periodic follow-up with the specialist structure, and by periodic scheduled accesses in order to ensure a greater appropriateness in the dispensing of these medicines.*
13	District, specialist	**13. Number of outpatient specialist magnetic resonance exams given per 100 residents**	*Indicator of specialist activity based on the number of magnetic resonance exams given with respect to the population. It takes into account both the possible lack of guarantee of the level of care, and the possible waste of resources due to inappropriateness.*
14	District, mental health	**14. Number of patients receiving care at the mental health departments per 1,000 residents**	*Indicator of healthcare activity provided to patients followed by mental health centers.*
15	Hospital	**15.1 Standardized hospitalization (ordinary and day) rate per 1,000 residents**	*Indicators of hospital demand and appropriateness of day hospital admissions*
		15.2 Day hospital admission rate for diagnostic purposes per 1,000 residents	
	Hospital	**15.3 Medical type access rate (standardized by age) per 1,000 residents**	*Indicator of hospital demand and appropriateness of day hospital admissions*
17	Hospital	**17. Ratio between hospitalizations attributed to DRGs with a high risk of inappropriateness (Annex B of the 2010-2012 Pact for Health) and hospitalizations attributed to DRGs with no risk of inappropriateness under the ordinary system**	*Indicator of inappropriateness of the care setting. Is based on the list of the 108 DRGs with a high risk of inappropriateness if provided under the ordinary system as described in the Agreement of 3 December 2009.*
18	Hospital	**18.1.1 Percentage of primary Caesarian sections in maternity department of level II or anyway with >=1000 births**	*Indicators on the appropriate performance of primary Caesarian sections in Italy and on the access to intensive care for extremely pre-term infants, decisive for the survival and future quality of life of the baby.*
		18.1.2 Percentage of primary Caesarian sections in maternity department of level I or anyway with <1000 births	
		18.2 Percentage of extremely pre-term births which took place in places without a NICU	
19	Hospital	**19. Percentage of patients (age 65+) with diagnoses of femoral neck fractures who are operated on within 2 days under the ordinary system**	*The indicator is included among the hospital care quality indicator selected by the OECD for comparisons. It assesses the taking charge of the healthcare organization and its response time to the need for care of patients with femoral fractures.*
21	Emergency	**21. Alarm-Target interval of the emergency vehicles (in minutes)**	*Innovative indicator of functionality and rapidity of the healthcare organization in charge of the territorial emergency system. In particular, it assesses the performance of the "118" emergency phone number service.*

Source: Ministero della Salute – Direzione Generale della Programmazione Sanitaria, Ufficio VI (2019)

APPENDIX 2.

TABLE A2.1 - Analisi MCA per 2002 - Età >=45 <=74, Scomposizione dell'inerzia e del chi-quadrato

Scomposizione dell'inerzia e del chi-quadrato

Valore singolare	Inerzia principale	Chi-quadrato	Percentuale	Percentuale cumulativa
0.65243	0.42566	441215	3.45	3.45
0.60882	0.37066	384206	3.01	6.46
0.60211	0.36253	375776	2.94	9.40
0.59787	0.35745	370508	2.90	12.29
0.59353	0.35228	365152	2.86	15.15
0.58961	0.34764	360344	2.82	17.97
0.58646	0.34393	356499	2.79	20.76
0.58342	0.34038	352819	2.76	23.52
0.57735	0.33333	345511	2.70	26.22
0.57735	0.33333	345511	2.70	28.92
0.57735	0.33333	345511	2.70	31.63
0.57735	0.33333	345511	2.70	34.33
0.57735	0.33333	345511	2.70	37.03
0.57735	0.33333	345511	2.70	39.73
0.57735	0.33333	345511	2.70	42.44
0.57735	0.33333	345511	2.70	45.14
0.57735	0.33333	345511	2.70	47.84
0.57735	0.33333	345511	2.70	50.55
0.57735	0.33333	345511	2.70	53.25
0.57735	0.33333	345511	2.70	55.95
0.57735	0.33333	345511	2.70	58.65
0.57735	0.33333	345511	2.70	61.36
0.57735	0.33333	345511	2.70	64.06
0.57735	0.33333	345511	2.70	66.76
0.57735	0.33333	345511	2.70	69.46
0.57735	0.33333	345511	2.70	72.17
0.57735	0.33333	345511	2.70	74.87
0.57735	0.33333	345511	2.70	77.57
0.57735	0.33333	345511	2.70	80.27
0.57179	0.32695	338893	2.65	82.93
0.56918	0.32396	335799	2.63	85.55
0.56595	0.32029	331995	2.60	88.15
0.56346	0.31748	329082	2.57	90.72
0.55670	0.30992	321240	2.51	93.24
0.55373	0.30662	317822	2.49	95.72
0.54904	0.30144	312452	2.44	98.17
0.47551	0.22611	234373	1.83	100.00
	12.3333	1.278E7	100.00	

Gradi di libertà = 1521

**TABLE A2.2 - Analisi MCA per 2002 - Età >=45 <=74,
Contributi parziali all'inerzia per i punti
di colonna**

	Dim1	Dim2	Dim3
No	0.1169	0.0031	0.0005
Sì	0.2895	0.0078	0.0012
45	0.0293	0.0028	0.0188
46	0.0292	0.0042	0.0340
47	0.0284	0.0024	0.0313
48	0.0319	0.0003	0.0324
49	0.0150	0.0004	0.0089
50	0.0000	0.1048	0.0000
51	0.0000	0.0035	0.0009
52	0.0021	0.0295	0.0007
53	0.0040	0.0009	0.0058
54	0.0066	0.0392	0.0048
55	0.0043	0.0001	0.0000
56	0.0038	0.0126	0.0003
57	0.0045	0.0040	0.0019
58	0.0057	0.0015	0.0205
59	0.0049	0.0328	0.0004
60	0.0037	0.0249	0.0017
61	0.0050	0.0019	0.0010
62	0.0056	0.0147	0.0043
63	0.0081	0.0005	0.0039
64	0.0088	0.0007	0.0006
65	0.0059	0.0001	0.0388
66	0.0054	0.0016	0.0291
67	0.0069	0.0056	0.0017
68	0.0098	0.0016	0.0002
69	0.0055	0.0009	0.0000
70	0.0002	0.0782	0.0001
71	0.0083	0.0219	0.0785
72	0.0137	0.0037	0.0376
73	0.0118	0.0054	0.0577

TABLE A2.2 - Analisi MCA per 2002 - Età >=45 <=74,
Contributi parziali all'inerzia per i punti
di colonna

	Dim1	Dim2	Dim3
74	0.0108	0.0040	0.0570
BOLOGNA	0.0041	0.0216	0.2735
FERRARA	0.0426	0.0007	0.0029
IMOLA	0.0149	0.0083	0.0165
MODENA	0.0841	0.0002	0.1369
PARMA	0.0279	0.0328	0.0292
PIACENZA	0.0108	0.0017	0.0025
REGGIO EMILIA	0.0238	0.3881	0.0001
ROMAGNA	0.1063	0.1308	0.0637

TABLE A2.3 - Analisi MCA per 2010 - Età >=45 <=74, Scomposizione dell'inerzia e del chi-quadrato

Scomposizione dell'inerzia e del chi-quadrato

Valore singolare	Inerzia principale	Chi-quadrato	Percentuale	Percentuale cumulativa
0.65243	0.42566	441215	3.45	3.45
0.60882	0.37066	384206	3.01	6.46
0.60211	0.36253	375776	2.94	9.40
0.59787	0.35745	370508	2.90	12.29
0.59353	0.35228	365152	2.86	15.15
0.58961	0.34764	360344	2.82	17.97
0.58646	0.34393	356499	2.79	20.76
0.58342	0.34038	352819	2.76	23.52
0.57735	0.33333	345511	2.70	26.22
0.57735	0.33333	345511	2.70	28.92
0.57735	0.33333	345511	2.70	31.63
0.57735	0.33333	345511	2.70	34.33
0.57735	0.33333	345511	2.70	37.03
0.57735	0.33333	345511	2.70	39.73
0.57735	0.33333	345511	2.70	42.44
0.57735	0.33333	345511	2.70	45.14
0.57735	0.33333	345511	2.70	47.84
0.57735	0.33333	345511	2.70	50.55
0.57735	0.33333	345511	2.70	53.25
0.57735	0.33333	345511	2.70	55.95
0.57735	0.33333	345511	2.70	58.65
0.57735	0.33333	345511	2.70	61.36
0.57735	0.33333	345511	2.70	64.06
0.57735	0.33333	345511	2.70	66.76
0.57735	0.33333	345511	2.70	69.46
0.57735	0.33333	345511	2.70	72.17
0.57735	0.33333	345511	2.70	74.87
0.57735	0.33333	345511	2.70	77.57
0.57735	0.33333	345511	2.70	80.27
0.57179	0.32695	338893	2.65	82.93
0.56918	0.32396	335799	2.63	85.55
0.56595	0.32029	331995	2.60	88.15
0.56346	0.31748	329082	2.57	90.72
0.55670	0.30992	321240	2.51	93.24
0.55373	0.30662	317822	2.49	95.72
0.54904	0.30144	312452	2.44	98.17
0.47551	0.22611	234373	1.83	100.00
	12.3333	1.278E7	100.00	

Gradi di libertà = 1521

TABLE A2.4 - Analisi MCA per 2010 - Età >=45 <=74, Contributi parziali all'inerzia per i punti di colonna

	Dim1	Dim2	Dim3
No	0.3440	0.0012	0.0015
Sì	0.1584	0.0006	0.0007
45	0.0286	0.0241	0.0519
46	0.0025	0.0693	0.0001
47	0.0032	0.0482	0.0003
48	0.0003	0.0566	0.0015
49	0.0054	0.0887	0.0746
50	0.0077	0.0169	0.0098
51	0.0155	0.0017	0.0005
52	0.0014	0.0212	0.0146
53	0.0009	0.0162	0.0073
54	0.0003	0.0104	0.0223
55	0.0050	0.0185	0.0366
56	0.0032	0.0092	0.0002
57	0.0003	0.0212	0.0008
58	0.0021	0.0049	0.0144
59	0.0010	0.0239	0.0014
60	0.0096	0.0026	0.0000
61	0.0080	0.0088	0.0107
62	0.0059	0.0033	0.0095
63	0.0035	0.0070	0.0076
64	0.0017	0.0039	0.0040
65	0.0018	0.0100	0.0079
66	0.0014	0.0097	0.0092
67	0.0021	0.0050	0.0171
68	0.0010	0.0071	0.0149
69	0.0009	0.0003	0.0074
70	0.0020	0.0034	0.0047
71	0.0000	0.0127	0.0513
72	0.0032	0.0046	0.0707
73	0.0014	0.0002	0.0393
74	0.0000	0.0191	0.0240

**TABLE A2.4 - Analisi MCA per 2010 - Età >=45 <=74,
Contributi parziali all'inerzia per i punti
di colonna**

	Dim1	Dim2	Dim3
BOLOGNA	0.0824	0.0154	0.0010
FERRARA	0.0561	0.0051	0.2309
IMOLA	0.0085	0.0347	0.0105
MODENA	0.0118	0.2779	0.0149
PARMA	0.0424	0.0087	0.0192
PIACENZA	0.0893	0.0535	0.0180
REGGIO EMILIA	0.0837	0.0737	0.1830
ROMAGNA	0.0034	0.0002	0.0056

TABLE A2.5 - Analisi MCA per 2016 - Età >=45 <=74, Scomposizione dell'inerzia e del chi-quadrato

Scomposizione dell'inerzia e del chi-quadrato

Valore singolare	Inerzia principale	Chi-quadrato	Percentuale	Percentuale cumulativa
0.73200	0.53582	612831	4.34	4.34
0.60466	0.36561	418161	2.96	7.31
0.59683	0.35620	407400	2.89	10.20
0.59549	0.35461	405575	2.88	13.07
0.59083	0.34908	399246	2.83	15.90
0.58679	0.34432	393811	2.79	18.69
0.58342	0.34038	389301	2.76	21.45
0.57782	0.33388	381868	2.71	24.16
0.57735	0.33333	381242	2.70	26.86
0.57735	0.33333	381242	2.70	29.57
0.57735	0.33333	381242	2.70	32.27
0.57735	0.33333	381242	2.70	34.97
0.57735	0.33333	381242	2.70	37.67
0.57735	0.33333	381242	2.70	40.38
0.57735	0.33333	381242	2.70	43.08
0.57735	0.33333	381242	2.70	45.78
0.57735	0.33333	381242	2.70	48.49
0.57735	0.33333	381242	2.70	51.19
0.57735	0.33333	381242	2.70	53.89
0.57735	0.33333	381242	2.70	56.59
0.57735	0.33333	381242	2.70	59.30
0.57735	0.33333	381242	2.70	62.00
0.57735	0.33333	381242	2.70	64.70
0.57735	0.33333	381242	2.70	67.40
0.57735	0.33333	381242	2.70	70.11
0.57735	0.33333	381242	2.70	72.81
0.57735	0.33333	381242	2.70	75.51
0.57735	0.33333	381242	2.70	78.22
0.57735	0.33333	381242	2.70	80.92
0.57436	0.32989	377309	2.67	83.59
0.57124	0.32631	373210	2.65	86.24
0.56796	0.32258	368944	2.62	88.85
0.56423	0.31835	364107	2.58	91.44
0.55839	0.31180	356617	2.53	93.96
0.55667	0.30988	354419	2.51	96.48
0.54877	0.30115	344433	2.44	98.92
0.36531	0.13345	152633	1.08	100.00
	12.3333	1.411E7	100.00	

Gradi di libertà = 1521

TABLE A2.6 - Analisi MCA per 2016 - Età >=45 <=74, Contributi parziali all'inerzia per i punti di colonna

	Dim1	Dim2	Dim3
No	0.4013	0.0000	0.0001
Sì	0.0928	0.0000	0.0000
45	0.0000	0.0200	0.0081
46	0.0104	0.0011	0.0137
47	0.0023	0.0041	0.0273
48	0.0027	0.0001	0.0145
49	0.0044	0.0024	0.0164
50	0.0001	0.1425	0.0045
51	0.0014	0.0997	0.1405
52	0.0005	0.0004	0.0011
53	0.0024	0.0729	0.0052
54	0.0001	0.0382	0.0096
55	0.0026	0.0106	0.0016
56	0.0003	0.0006	0.0209
57	0.0009	0.0020	0.0000
58	0.0000	0.0127	0.0170
59	0.0004	0.0130	0.0141
60	0.0002	0.0005	0.0001
61	0.0000	0.0368	0.0598
62	0.0001	0.0013	0.0194
63	0.0001	0.0053	0.0029
64	0.0000	0.0023	0.0007
65	0.0003	0.0028	0.0022
66	0.0001	0.0007	0.0110
67	0.0002	0.0089	0.0182
68	0.0002	0.0000	0.0077
69	0.0006	0.0000	0.0108
70	0.0007	0.0001	0.0009
71	0.0003	0.0013	0.0012
72	0.0010	0.0000	0.0013
73	0.0013	0.0039	0.0012
74	0.0026	0.0129	0.0609

TABLE A2.6 - Analisi MCA per 2016 - Età >=45 <=74,
Contributi parziali all'inerzia per i punti
di colonna

	Dim1	Dim2	Dim3
BOLOGNA	0.0065	0.0002	0.2000
FERRARA	0.0020	0.1511	0.0743
IMOLA	0.0024	0.0141	0.0550
MODENA	0.0084	0.0093	0.0150
PARMA	0.0680	0.0128	0.0285
PIACENZA	0.3592	0.0218	0.0000
REGGIO EMILIA	0.0107	0.2928	0.0053
ROMAGNA	0.0122	0.0007	0.1289