Chapter 2

The Future Population Health of the Industrialized Countries

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Additional information is available at the end of the chapter

http://dx.doi.org/10.5772/67819

Abstract

The more developed countries are experiencing an inexorable decline with respect to population. Aging is reaching intolerable levels in the economy, both from the active (available workers) and the passive (e.g. health costs, pensions) point of view, redesigning a worrying scenario for the near future. On the other hand, fertility in many countries, and particularly in Italy, reaches such low levels that the prospects of a recovery, in terms of quantity, now seem impractical, unless of socio-demographic upheavals rather unlikely. In this context, most likely, from the point of view of demographic and social, he is starting a new era in which the main actors on the global stage will certainly be different from those in the field today, with completely obscure scenarios and still in the making. Surely, however, this situation has generated fears and concerns about the future of the population, especially for some signals that in the course of 2015 were recorded in Italy, such as the surge in mortality, especially with regard to older ages, where some observers have linked this phenomenon to a reduction in public spending in the health sector, a situation that would have penalized, certainly, the older age groups. On closer analysis, however, we realize that, precisely due to aging of the population of elderly, quotas have gradually increased, causing a swollen available to die, with the same probability of death.

Keywords: population, health, labor market, fertility, development

1. Introduction

The more developed countries are experiencing an inexorable decline with respect to the population. Aging is reaching intolerable levels in the economy, both from the active (available workers) and the passive (e.g. health costs, pensions) point of view, redesigning a worrying scenario for the near future.

On the other hand, fertility in many countries, and particularly in Italy, reaches such low levels that the prospects of a recovery, in terms of quantity, now seem impractical, unless of socio-demographic upheavals rather unlikely.

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Surely, however, this situation has generated fears and concerns about the future of the population, especially for some signals that in the course of 2015 were recorded in Italy, such as the surge in mortality, especially with regard to older ages, where some observers have linked this phenomenon to a reduction in public spending in the health sector, a situation that would have penalized, certainly, the older age groups. On closer analysis, however, we realize that, precisely due to aging of the population of elderly, quotas have gradually increased, causing a swollen available to die, with the same probability of death.

We are at the dawn of a new world, and the population of the planet will be substantially transformed over the next 30–40 years, according to the latest update made by the World Bank (World Population Prospects: The 2015 Revision. New York: United Nations). The world population has reached 7 billion people in 2015 and will rise to 9 billion around 2050, an increase due mainly to developing countries.

But the most significant fact is that few countries will contribute to more than half the increase worldwide, especially this will be due to the contribution of India, Pakistan, Nigeria, Ethiopia, the United States, Congo, Tanzania, China, and Bangladesh.

The World Bank, which had already produced in the 1980s of the projections that had left the whole world into turmoil, when it predicted that the world population would reach 20 billion people already in 2020, has, as a precautionary measure, developed based on the assumption that projections fertility decline through woman from the current global level of 2.5 children to 2.1, from now until 2050. Population of the 49 least developed countries is growing still faster than the rest of the world, at a pace of 2–3% a year, as published by the Population Division.

While it is expected that the population of developing countries as a whole will increase from 6 billion today to 7.9 billion in 2050, the population of more developed regions will not change much, passing from 1.23 to 1.28 billion.

The latter would have had to decrease to 1.15 billion were it not for the projected net rate of migration from developing countries to developed countries, which provides for the annual shift of about 2–2.5 million people over the next 30–40 years.

Also, according to the projections of the World Bank, the scenario is even more disheartening for Europe, as a whole, in fact, to the middle of the twenty-first century the population of the old continent not even reach 8% of the world's population and, even more worrying, this will be characterized by a high seniority, against the rest of the world, however, will feature a very young population

http://dx.doi.org/10.5772/67819

2. Some consideration about Italian population

The demographic structure of population of all developed countries, and especially that of Italy, has been shaped, as is stated in any book of demographic analysis, by the effect of great transformations that have powered the path of evolution in the twentieth century in general and since the end of the Second World War in particular.

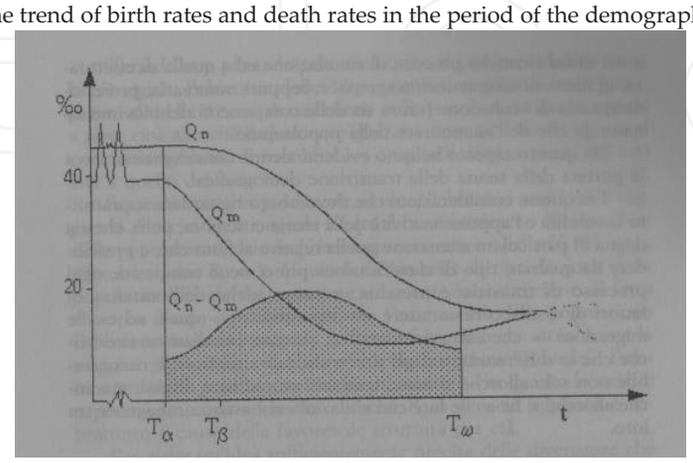
Great structural movements that have characterized the evolution of the Italian population in the long term were initially that of the *demographic transition*, then the era of *baby boom* and finally the *low-low fertility*.

The demographic transition,[1] in fact, marks the passage of a population from an archaic development model, characterized essentially by high levels of fertility and mortality, a structure of particularly young age and a hierarchical disorder between parents and children [1][2] (the latter dying before the former in large numbers) to a model of modern development, with values 10 of birth rates and death rates particularly low (and stable), a structure of much older age, and with the restoration of a more normal hierarchical order in the chronology of deaths between children and parents.

In the completion of the demographic transition process, the values of the quotients of natality and mortality pass from rather high levels, even around 40–60% to much lower values which, at the end of the process, can reach values even around 7–8% (**Figure 1** and **Table 1**, as regards Italy). This underlines a transformation of the vivacity of the natural movements: before the transition, the situation is characterized by many births and many premature deaths (with a large number of children deaths); after the transition, the situation is characterized by fewer births but with the lengthening of life span [2] due to the collapse of mortality in younger ages (known as infant mortality).

In case of the birth rate, the reduction process is uniquely determined by the inexorable reduction in births and by an important increase in procreation age of the mother (but also of

[1]Scheme generalized by the trend of birth rates and death rates in the period of the demographic transition.



[2]Livi Bacci, which emphasizes how this problem was actually at the base of the high birth rates. In essence, the couples (or families) produced more children in order to guarantee in the long term the survival of at least some of them, given the high level of mortality during childhood.

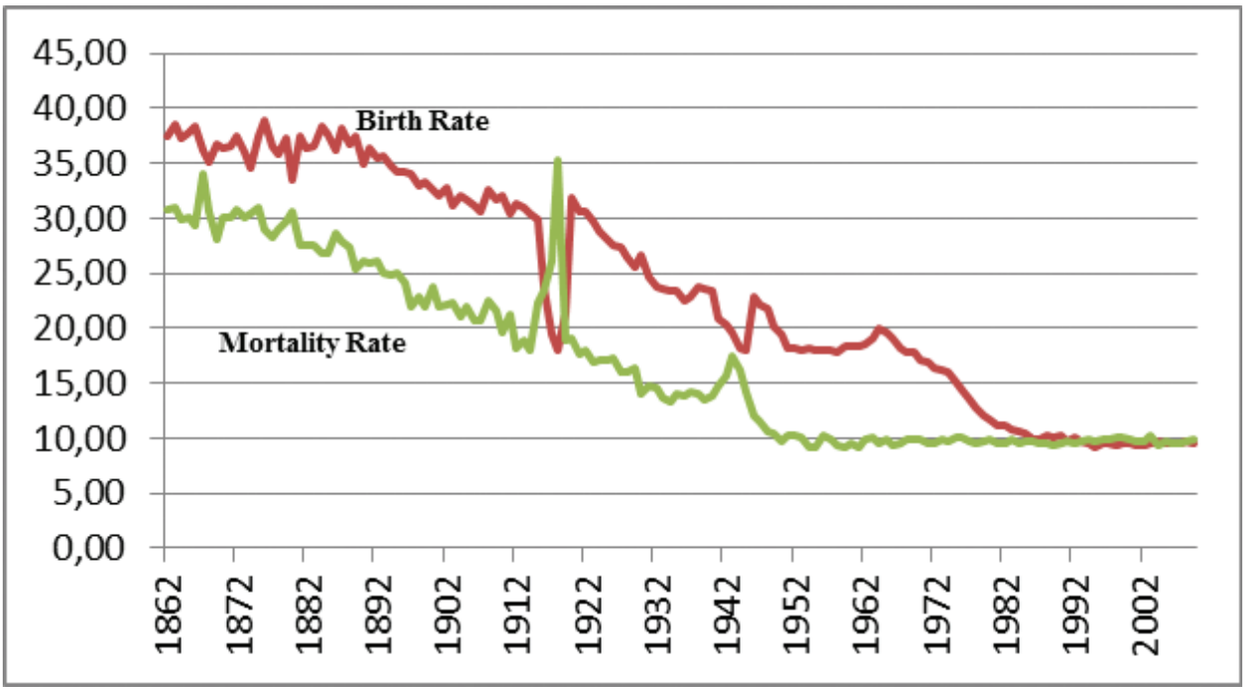


Figure 1. Evolution of natality and mortality quotients in Italy, 1862–2015.[6] Source: our elaboration on ISTAT's data. [6]Figure loosely based on and adapted from Iaquinta [7].

the father) [3–5][3] [4] especially the "primiparous mother," whereas in case of the reduction path of mortality ratios and therefore mortality in general, there are many factors involved in its determination, because mortality is distributed in all age groups with a gradually increasing incidence.

The baby boom, however, which takes place temporarily at least in Italy around the end of the demographic transition process, is a typically Italian phenomenon. In this phenomenon, because of the contraction due to the traumatic effects of the Second World War, strong economic expansion of the 1960s is associated with a sharp increase in births such as to reach the point to return to pre-conflict levels, in the presence, however, of a period in which the mortality (especially infant mortality) lowering effect keeps alive a large number of births well beyond that found previously [2].

[3]These concepts have already been widely anticipated and explored in numerous scientific papers, including, in particular, we point out P. Iaquinta—T. Traversa, Evoluzione della fecondità nelle società post-transizionali, the paper presented at the Giornate di Studio della Popolazione, Milano 20-22 febbraio 2001; P. Iaquinta, *La fecondità in Italia. Integrazione ed omogeneizzazione dei dati con modellistica ARIMA*, in G. Da Molin, Prospettive di ricerca, Collana "Saggi e Ricerche" del Dipartimento di Scienze storiche e geografiche, n° 34, Bari, 2003; P. Iaquinta, *Some consideration about fertility in Italy. Methodological Problems*, International Area Review, Hankuk University of Foreign Studies, Korea, vol. 6, N°. 2, Fall 2003.
[4]Figure loosely based on and adapted from the text: P. Iaquinta, *Crisi di mortalità: il contributo delle interruzioni volontarie di gravidanza,* in P. B. Helzel – A. J. Katolo, *Autorità e crisi dei poteri,* Cedam, Padova, 2012.

Year	Births	Year	Births	Year	Births
1926	1,094,587	**1956**	873,608	**1986**	555,445
1927	1,093,772	**1957**	878,906	**1987**	551,539
1928	1,072,316	**1958**	870,468	**1988**	569,698
1929	1,037,700	**1959**	901,017	**1989**	560,688
1930	1,092,678	**1960**	910,192	**1990**	569,255
1931	1,026,197	**1961**	929,657	**1991**	562,787
1932	990,995	**1962**	937,257	**1992**	567,841
1933	995,979	**1963**	960,336	**1993**	549,484
1934	992,966	**1964**	1,016,120	**1994**	533,050
1935	996,708	**1965**	990,458	**1995**	525,609
1936	962,686	**1966**	979,940	**1996**	528,103
1937	991,867	**1967**	948,772	**1997**	534,462
1938	1,037,180	**1968**	930,172	**1998**	531,548
1939	1,040,213	**1969**	932,466	**1999**	523,463
1940	1,046,479	**1970**	901,472	**2000**	538,999
1941	937,546	**1971**	906,182	**2001**	528,876
1942	926,063	**1972**	888,203	**2002**	509,340
1943	882,105	**1973**	874,546	**2003**	513,657
1944	814,746	**1974**	868,882	**2004**	546,989
1945	815,678	**1975**	827,852	**2005**	549,110
1946	1,036,098	**1976**	781,638	**2006**	556,427
1947	1,011,490	**1977**	741,103	**2007**	564,365
1948	1,005,851	**1978**	709,043	**2008**	569,366
1949	937,146	**1979**	670,221	**2009**	564,573
1950	908,622	**1980**	640,401	**2010**	561,944
1951	860,998	**1981**	623,103	**2011**	546,607
1952	844,447	**1982**	619,097	**2012**	534,186
1953	839,478	**1983**	601,928	**2013**	514,308
1954	870,689	**1984**	587,871	**2014**	502,596
1955	869,333	**1985**	577,345	**2015**	485,780

Source: ISTAT, Data warehouse, 2017.

Table 1. Live births in Italy, 1926–2015.

This effect made a high portion of births reach the adult age and hence it would be more appropriate to speak of *living boom* rather than *baby boom*; in fact, before the Second World War, about 30% of births did not reach the age of 5, in the 1960–1970s, this proportion already fell to

about 3% [6], and in the future, thanks to the contribution of the infamous therapeutic interruption of pregnancy [7], it might fall very easily below 0.3–0.4%, reducing by hundred times the impact of mortality on the survival of the younger generations.

The great economic crisis of the Western world, which started at the beginning of the 1970s, constitutes actually the divide between an old and a new world, in which the powerful and extraordinary parameter of post-bellum development has to come to terms with a new world order.

Perhaps, for the first time, after the feast of progress and indiscriminate growth of the post-Second World War, the Western world is forced to come to terms with a new incumbent danger that hits it: the great oil crisis. This is a crisis, far from being just a purely economic one; in fact, it entails a reconsideration of the entire developed world, calling into question priorities and needs of the entire modern world.

To this situation, dramatic to some extent, countries react with a structural change which also involves the most basic units of social life, such as the family, featuring its new roles, its structure, and especially its composition.

It is at this point that takes shape in Italy the era of *Low-Low Fertility* [8], a time in which the level of fertility of Italian women reaches values which will not be in a position to ensure the replacement of generations (but similar events were experienced in France, Germany, and the Scandinavian countries).

The number of annual births in Italy precipitates from 1,016,000 births in 1964 to around 500,000 since the 1980s, inexorably sealing the fate of the Italian population in terms of both the reproductive capacity and the age structure, which is bound to have a lot of old people beyond any imagination.

Profound behavioral changes in the population, especially those quantitative ones, with respect to the demographic events, have an impact at easily recognizable intervals on the dynamic of labor market entry and exit, respectively, after 20 years in the case of entry and after 60 years in the case of exit.

This simple consideration opens new scenarios of the labor market: if it is true that in the 1960s there were births double those in the 1990s, roughly a quarter of a century later, these births (which, among other things, took place in the living boom era) will present themselves at the entrance of the world of work. Situation will be more regrettable when more or less after 30–35 years from this circumstance, these same generations will approach the exit threshold of the world of work, especially because the next generations born in the era of low-low fertility will not be so large as to ensure the replacement of those in exit.

This will highlight, in a short time, an irreversible condition: the number of people in exit will exceed by far that in entry into the labor market suffocated by the level of unemployment which these first five years of global economic crisis highlighted in a stringent way.

http://dx.doi.org/10.5772/67819

3. Labor market and demography

To evaluate the possible scenario for the next generations, in terms of world of work and employment recovery, a comparison between the generations of people willing to enter the labor market and those willing to exit from it was made to analyze what might happen in the near future as a result of the demographic changes that have characterized the Italian socio-economic life after the Second World War.

To estimate the quantitative effects of the baby boom and low-low fertility on the population, two age groups temporarily willing to turnover were chosen, and a possible future scenario was built projecting the population data.

From the methodological point of view, the age groups relevant to this examination are that of 20–30 years willing to enter the labor market and that of 60–70 years willing to exit from it.

Then, a projection of the Italian population was made with the classic method, using as initial data the population enrolled in the registry office in 2016, the mortality table of 2012, the series of specific quotients of fertility by age of 2011.

The data used were derived from the official source (ISTAT) and were chosen because these were the most currently available in their specific nature, emphasizing that we are making hypothesis on evolutionary scenarios and approximations.

Also available are excellent forecasts built with self-modeling regression and moving average model (ARMA and ARIMA). Even though such models are precise and effective, these results, being available only in an aggregate form compared to the initial data, do not allow us to isolate the various components in order to assess the influence of any politico-social choice that

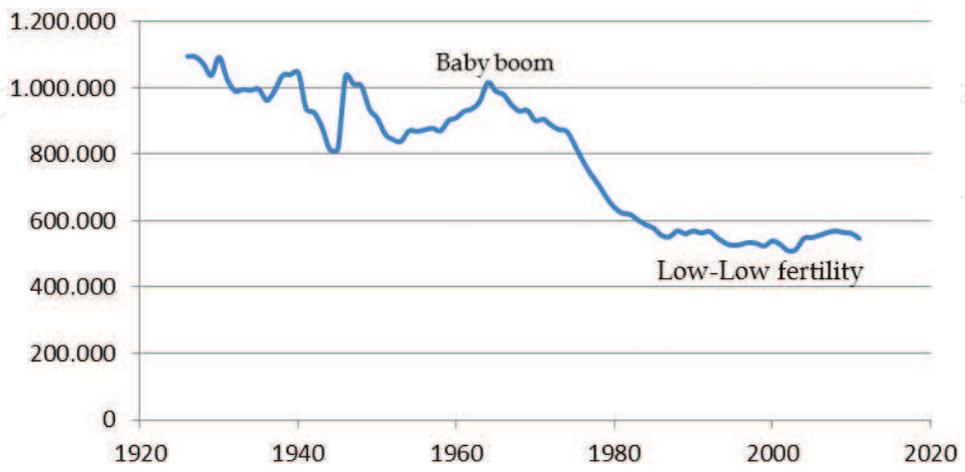


Figure 2. Live births in Italy, 1926–2015. Source: our elaboration on ISTAT's data, warehouse, 2017.

should be taken in the near future. In essence, therefore, the possibility to isolate the components of natality, mortality, and migration in the elaboration of projections allows us to make more probable assumptions about the future of the population itself.

Table 1 and **Figure 2** show the evolution of the number of births between the first quarter of the last century and the present day. **Table 1** highlights the specific trend of the natality level, which affected and still continues to affect the social life in Italy.

Until the Second World War, the birth level was still maintained high in values consistently above the million births per year, with inevitable fluctuations due, in large part, to the approaching of the great crisis that would lead to disastrous conflict.

In any case, the last conflict represented a sort of "threshold value," a kind of divide between the old and the new world, also from the behavioral point of view in relation to the demographic events and to the reproductive process in particular.

In addition, the years after the Great War are also the years in which the reconstruction begins: Italy laboriously starts to develop and this goes at the same rate with great (demographic) achievements such as the sudden collapse of infant mortality.

4. Italian population projection

As mentioned, in order to properly estimate the structure of the Italian population in the coming years and, above all, in order to be able to isolate the components contextually involved in such a determination, it was chosen to make standard projections in an autonomous way so as to govern the individual variables and, eventually, assume alternative hypotheses on the individual components which interact in the formation of the future population.

In order to build the projections, the age structure of the population was derived from the official statistics ISTAT 2017, the latest available data [9]. The table of mortality, used to infer the survival rates [9], aimed to project the population in the next quinquennial age group, was available for 2010; the specific fertility [10] quotients by age were of 2011 (**Tables 2a–c**).

This heterogeneity of reference period must not be misleading in the projection framework, where the choices made are sufficiently aleatory and do not significantly affect the final data.

Rather, it should be clear that we are talking about future hypothesis, estimates, and, therefore, plausible (but certainly not real) values; one argument against it could rather be dictated by the fact that current indicators are largely used in referring to very variable demographic phenomena in order to estimate behaviors in the events of even 40 years ahead.

In any case, before going on, it would be better to underline some methodological limits of this technique, which may affect the results and, therefore, the indicators derived from them.

Age classes	Female 01/01/2016	Px=Lx+s/Lx	Female population projected at the 01-01								
			2021	2026	2031	2036	2041	2046	2051	2056	2061
0–4	1250,442	0.999474	1143,505	1044,171	980,584	940,876	906,465	858,629	796,235	734,297	684,085
5–9	1385,255	0.999615	1249,785	1142,903	1043,622	980,068	940,381	905,989	858,177	795,817	733,911
10–14	1384,866	0.999399	1384,721	1249,303	1142,463	1043,220	979,690	940,018	905,640	857,847	795,510
15–19	1391,122	0.999078	1384,034	1383,889	1248,553	1141,777	1042,594	979,102	939,454	905,096	857,331
20–24	1472,791	0.999053	1389,839	1382,758	1382,613	1247,401	1140,724	1041,632	978,199	938,587	904,261
25–29	1607,399	0.998796	1471,396	1388,522	1381,448	1381,303	1246,219	1,139,643	1,040,645	977,272	937,698
30–34	1761,403	0.998214	1605,464	1469,624	1386,850	1379,784	1379,640	1,244,719	1,138,271	1,039,392	976,095
35–39	2037,299	0.997132	1758,257	1602,596	1466,999	1384,373	1377,320	1,377,176	1,242,495	1,136,238	1,037,536
40–44	2399,975	0.995115	2031,457	1753,215	1598,000	1462,792	1380,403	1,373,370	1,373,226	1,238,932	1,132,979
45–49	2490,023	0.992087	2388,251	2021,533	1744,650	1590,194	1455,647	1373,660	1,366,661	1,366,518	1,232,880
50–54	2420,239	0.987580	2470,319	2369,353	2005,537	1730,845	1577,611	1444,128	1,362,790	1,355,847	1,355,705
55–59	2110,923	0.981367	2390,181	2439,639	2339,926	1980,629	1709,349	1558,018	1,426,192	1,345,865	1,339,008
60–64	1891,237	0.970783	2071,590	2345,644	2394,181	2296,326	1943,723	1677,498	1,528,987	1,399,618	1,320,787
65–69	1927,499	0.952879	1835,981	2011,064	2277,111	2324,230	2229,235	1886,934	1,628,487	1,484,315	1,358,725
70–74	1533,451	0.916280	1836,673	1749,468	1916,301	2169,812	2214,710	2124,191	1,798,019	1,551,751	1,414,372
75–79	1552,174	0.841945	1405,071	1682,907	1603,002	1755,869	1988,155	2029,295	1,946,354	1,647,490	1,421,838
80–84	1227,709	0.708507	1306,845	1182,992	1416,915	1349,640	1478,345	1673,917	1,708,555	1,638,723	1,387,095
85–89	857,207	0.522058	869,840	925,909	838,158	1003,894	956,229	1047,417	1,185,982	1,210,523	1,161,046
90–94	407,669	0.304686	447,512	454,107	483,378	437,567	524,091	499,207	546,813	619,152	631,964
95–99	100,547	0.166759	124,211	136,351	138,360	147,279	133,321	159,684	152,102	166,606	188,647
Totale	31,209,230		30,564,931	29,735,949	28,788,653	27,747,879	26,603,851	25,334,226	23,923,284	22,409,884	20,871,475

Source: our elaboration on ISTAT's data.

Table 2a. Female Italian population projected on 1 January.

http://dx.doi.org/10.5772/67819

Age classes	Male 01/01/2016	Px=Lx+s/Lx	Male population projected at the 01-01								
			2021	2026	2031	2036	2041	2046	2051	2056	2061
0–4	1,322,506	0.999388	1,227,872	1,138,837	1,082,305	1,042,681	1,004,104	952,421	888,899	828,593	780,447
5–9	1,469,465	0.999512	1,321,696	1,227,120	1,138,140	1,081,642	1,042,043	1,003,489	951,838	888,355	828,086
10–14	1,469,325	0.998736	1,468,748	1,321,051	1,226,521	1,137,584	1,081,114	1,041,534	1,002,999	951,373	887,921
15–19	1,490,426	0.997456	1,467,467	1,466,891	1,319,381	1,224,970	1,136,146	1,079,747	1,040,217	1,001,731	950,170
20–24	1,563,396	0.997159	1,486,634	1,463,734	1,463,159	1,316,024	1,221,854	1,133,256	1,077,001	1,037,571	999,182
25–29	1,653,304	0.996774	1,558,954	1,482,411	1,459,575	1,459,002	1,312,285	1,218,383	1,130,036	1,073,941	1,034,623
30–34	1,776,419	0.996181	1,647,971	1,553,926	1,477,629	1,454,868	1,454,296	1,308,052	1,214,453	1,126,391	1,070,477
35–39	2,043,171	0.994695	1,769,636	1,641,678	1,547,992	1,471,987	1,449,312	1,448,743	1,303,057	1,209,815	1,122,090
40–44	2,380,558	0.991699	2,032,333	1,760,248	1,632,970	1,539,781	1,464,179	1,441,624	1,441,058	1,296,145	1,203,398
45–49	2,441,662	0.986741	2,360,796	2,015,462	1,745,636	1,619,414	1,526,998	1,452,024	1,429,657	1,429,095	1,285,385
50–54	2,337,449	0.978082	2,409,288	2,329,495	1,988,739	1,722,491	1,597,942	1,506,752	1,432,772	1,410,701	1,410,147
55–59	1,990,139	0.963968	2,286,216	2,356,481	2,278,436	1,945,149	1,684,737	1,562,918	1,473,727	1,401,368	1,379,781
60–64	1,755,003	0.942458	1,918,430	2,203,839	2,271,572	2,196,339	1,875,061	1,624,032	1,506,603	1,420,625	1,350,874
65–69	1,757,419	0.908633	1,654,017	1,808,041	2,077,027	2,140,862	2,069,958	1,767,167	1,530,583	1,419,911	1,338,880
70–74	1,322,775	0.851469	1,596,850	1,502,895	1,642,846	1,887,256	1,945,259	1,880,833	1,605,707	1,390,739	1,290,178
75–79	1,227,379	0.748313	1,126,302	1,359,668	1,279,669	1,398,833	1,606,940	1,656,328	1,601,472	1,367,210	1,184,171
80–84	826,785	0.594712	918,463	842,826	1,017,457	957,593	1,046,765	1,202,494	1,239,452	1,198,402	1,023,101
85–89	448,203	0.418676	491,699	546,221	501,239	605,094	569,492	622,523	715,137	737,117	712,704
90–94	154,221	0.235102	187,652	205,863	228,690	209,857	253,338	238,433	260,636	299,411	308,613
95–99	26,716	0.137514	36,258	44,117	48,399	53,765	49,338	59,560	56,056	61,276	70,392
Total	29,456,321	0.04	28,967,283	28,270,804	27,427,381	26,465,192	25,391,161	24,200,314	22,901,358	21,549,768	20,230,620

Source: our elaboration on ISTAT's data.

Table 2b. Male Italian population projected on 1 January.

Age classes	Population 01/01/2016	Px=Lx+s/Lx	Population projected at the 01-01								
			2021	2026	2031	2036	2041	2046	2051	2056	2061
0–4	2,572,948	0.999474	2,371,377	2,183,009	2,062,889	1,983,557	1,910,569	1,811,050	1,685,135	1,562,890	1,464,532
5–9	2,854,720	0.999615	2,571,481	2,370,023	2,181,762	2,061,711	1,982,424	1,909,477	1,810,015	1,684,172	1,561,997
10–14	2,854,191	0.999399	2,853,469	2,570,354	2,368,984	2,180,804	2,060,805	1,981,552	1,908,638	1,809,220	1,683,431
15–19	2,881,548	0.999078	2,851,502	2,850,780	2,567,933	2,366,747	2,178,739	2,058,849	1,979,671	1,906,826	1,807,502
20–24	3,036,187	0.999053	2,876,473	2,846,492	2,845,772	2,563,425	2,362,577	2,174,887	2,055,199	1,976,158	1,903,443
25–29	3,260,703	0.998796	3,030,350	2,870,933	2,841,023	2,840,305	2,558,504	2,358,025	2,170,681	2,051,213	1,972,321
30–34	3,537,822	0.998214	3,253,435	3,023,550	2,864,479	2,834,652	2,833,936	2,552,771	2,352,723	2,165,783	2,046,572
35–39	4,080,470	0.997132	3,527,893	3,244,274	3,014,991	2,856,360	2,826,632	2,825,918	2,545,553	2,346,053	2,159,625
40–44	4,780,533	0.995115	4,063,790	3,513,463	3,230,970	3,002,573	2,844,582	2,814,994	2,814,284	2,535,078	2,336,377
45–49	4,931,685	0.992087	4,749,047	4,036,995	3,490,286	3,209,608	2,982,645	2,825,684	2,796,318	2,795,613	2,518,265
50–54	4,757,688	0.987580	4,879,608	4,698,847	3,994,275	3,453,336	3,175,553	2,950,880	2,795,562	2,766,548	2,765,851
55–59	4,101,062	0.981367	4,676,397	4,796,120	4,618,362	3,925,778	3,394,085	3,120,936	2,899,919	2,747,232	2,718,789
60–64	3,646,240	0.970783	3,990,020	4,549,483	4,665,753	4,492,666	3,818,785	3,301,530	3,035,590	2,820,243	2,671,661
65–69	3,684,918	0.952879	3,489,998	3,819,105	4,354,138	4,465,092	4,299,193	3,654,101	3,159,069	2,904,225	2,697,606
70–74	2,856,226	0.916280	3,433,523	3,252,363	3,559,147	4,057,068	4,159,969	4,005,024	3,403,727	2,942,489	2,704,551
75–79	2,779,553	0.841945	2,531,373	3,042,576	2,882,672	3,154,702	3,595,096	3,685,623	3,547,826	3,014,700	2,606,010
80–84	2,054,494	0.708507	2,225,308	2,025,819	2,434,373	2,307,233	2,525,109	2,876,411	2,948,006	2,837,125	2,410,197
85–89	1,305,410	0.522058	1,361,539	1,472,130	1,339,397	1,608,988	1,525,721	1,669,941	1,901,119	1,947,639	1,873,750
90–94	561,890	0.304686	635,164	659,970	712,068	647,424	777,430	737,640	807,449	918,563	940,577
95–99	127,263	0.166759	160,469	180,468	186,759	201,044	182,659	219,244	208,158	227,882	259,039
Total	60,665,551		59,532,214	58,006,753	56,216,034	54,213,071	51,995,012	49,534,539	46,824,642	43,959,652	41,102,094

Source: our elaboration on ISTAT's data.

Table 2c. Total population (male + female) projected on 1 January.

http://dx.doi.org/10.5772/67819

It seems obvious that, while talking about projections of such a distant time (2061), at least 40% of the population living at that time is a population that still has to be born; a population that will inevitably bring with them habits, customs, traditions, and ideas that probably have not yet been formed in the current social and political scenarios. This could also mean a different way of facing problems, such as reproductive life, family, and social organization.

At present, moreover, the path of that idea of political unity of Europe would seem less likely: in fact, Europe is struggling to feel truly one people also because of the undeniable, great tradition that distinguishes the individual peoples of Europe.

Certainly, the emergence or not of a strong (social and/or political) movement of restoration of the autonomous economies or the definitive success of the European community project might make it necessary to rewrite the pages of history entirely different from one another, which, although not universally accepted, certainly influence the demographic behavior of the future generations.

A further consideration which is necessary before carrying out the analysis concerns the immigration component, which must not be confused with the foreign component among population (currently) residing in Italy.

More than 4,030,000 foreigners entered the register [11] on 31 December (equal to over 7% of the population): they are regularly included in these calculations and are sufficiently adapted to the behaviors of native population in order to considerably modify therein the future demographic behavior.

On the other hand, the focus here is on the immigrant component that powers our population with an annual balance of about 230,000 foreign nationals resident in Italy (280,000 registrations from abroad against 40,000 cancellations).

This part of the population, without considering that illegal immigration which is by its nature difficult to quantify (and moreover with all attempts to estimate since the 1980s, badly failed), could affect the final results of the projection, but precisely because of absolute randomness, it remains an absolutely uncontrolled portion on which it is more appropriate to make specific ad hoc comments.

Of course, as always, to put forward a hypothesis about values so distant in time may turn out to be a scientific quirk rather than a real possibility of analysis, because, in any case, any method utilized may return plausible values only, ignoring, de facto, possible major shifts in socio-demographic behavior of the population.

In any case, in light of these premises, the projection of the population was made under the assumption, as already mentioned, that it is closed and so made in the absence of migratory movements. This choice, not made randomly, really intends to answer the initial assumption, which turns out to be: what would happen to the future generations of workers if the population were projected as it is in the future?

http://dx.doi.org/10.5772/67819

That is, to be more precise, what situation would be created to the relationship between outgoing generations and incoming generations in the labor market, if this demographic situation persisted?

The analysis, then, was carried out by building quinquennial projections between 2016 and 2061, a time when the strength of the generations born in the baby boom (and living boom) era should have exhausted, and that at that date they should be really residual by then from the quantitative point of view.

The projections, built with the standard method, have been built for five-year periods, so they are available every five years from 2016 to 2061, but for the obvious need for space, only some significant years that are functional to the initial hypothesis are reported here.

Reaffirming once again the weakness of precision resulting from having fixed, inexorably, the law of mortality and the law of current fertility, under the assumption that they be unchanged for the next half century (not entirely appropriate assumption, but not too dissimilar from reality, except for some small correction factors), the results of elaboration return values open to interesting considerations.

First, the wave of those born in the baby boom era is now coming to the end of the race. In 2061, only very few representatives of this "era" will still be alive, leaving behind them much

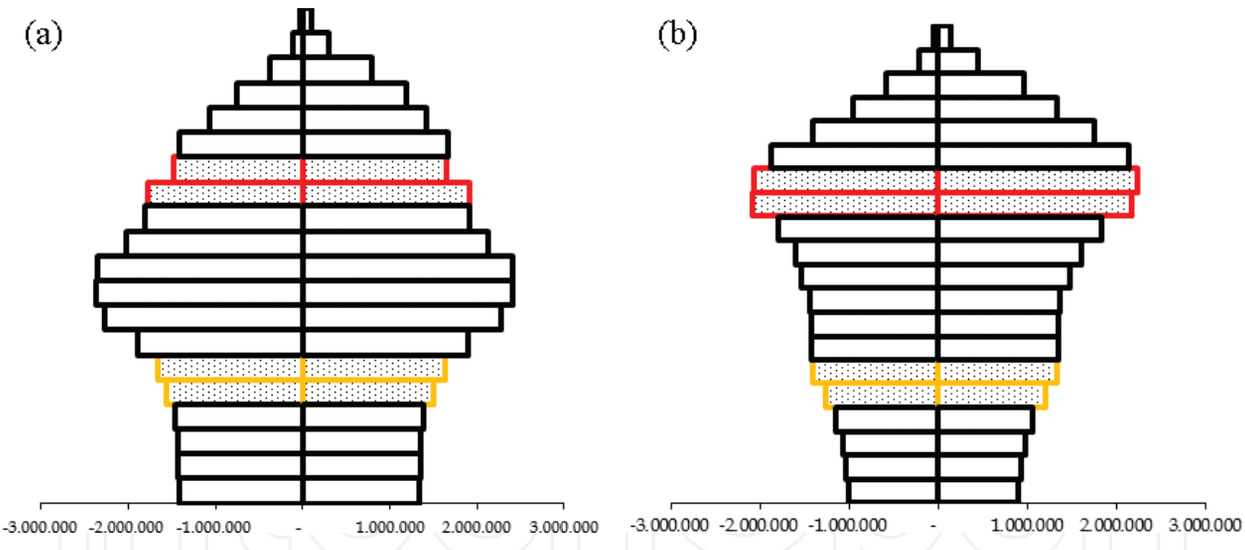


Figure 3. (a) Pyramid of Italian population, 2016. Source: our elaboration on ISTAT's data; (b) pyramid of Italian population, 2041. Source: our elaboration on ISTAT's data.

less consistent generations. These generations, although saved certainly by survival rates,[5] are, at the individual age, better than those that preceded them, will not be able to "replace" the generations of their predecessors. In simple terms, the Italian population is destined to decline

[5]The survival rate expresses in relative terms how many people belonging to the current age will reach the next one. In scientific terms: $px = (L_{x+s})/L_x$.

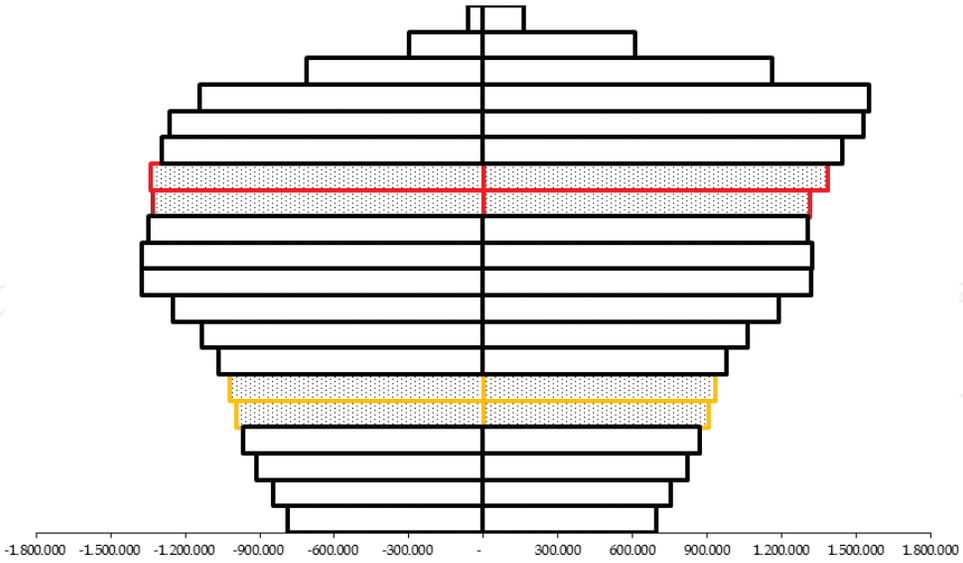


Figure 4. Pyramid of Italian population, 2061. Source: our elaboration on ISTAT's data.

substantially, starting already from the next few years with peaks of decline in the next two decades.

This situation is not only accompanied by the quantitative downsizing but will also reshape the population structure itself. In other words, the graphic representation of the population by age groups will hardly continue to be indicated as the "age pyramid" according to the data that will present themselves as a future scenario; it will rather have to be called the population "barrel" by age to reach, not so much time afterwards, the "inverted pyramid," where, for many years, (all those years for which the "baby-living-boom" lasted) the top of the graph will

Age groups	**Years**					
	2016	**2041**	**2046**	**2051**	**2056**	**2061**
0–20	18.40	15.64	15.67	15.77	15.84	15.86
65+	22.04	32.82	34.01	34.12	33.65	32.82
80+	6.67	9.64	11.11	12.52	13.49	13.34

Source: our elaboration on ISTAT's data.

Table 3. Percentage of population in age groups, Italy.

be much bigger than its bottom (despite in the presence of a slight recovery of women's fertility, which will, however, not be supported by an appropriate quantity of women available for procreation) [1].[6]

[6]Basically, as stated, the fertility rate will return increasing values due to the mother "in late" fertility recovery (35 years old and more); but the total of women in the age group available to procreate will be more bounded in the previous group, nullifying the effects of the improvement in the procreation propensity.

http://dx.doi.org/10.5772/67819

To confirm what has just been mentioned above, it is enough to observe what is shown in **Figures 2** and **3a** and **b**, which draw the age "pyramids" of the Italian population in 2016, 2041 (i.e., a quarter of century later), and 2061 (**Figure 4**, 45 years later) and in **Tables 2a–c**, which show the amount of the projections of the closed population, calculated from 2021 to 2061.

5. The health of industrialized populations

A major problem, which certainly will be faced in the coming decades, will be caused by the progressive aging of the population in all more developed countries and will reach very significant proportions particularly in Italy (**Table 3**).

In Italy, for example, around 2050, more than a third of the population will be over 65-year-old and a third of these will be over 80 years.

An important consideration, however, is that despite the generations that will overlook the threshold of the 80 years from 2050 will come from generations born in the late twentieth century, when, then, they had already a culture of health, the knowledge that styles correct and adequate life can improve the quality of life, especially by the elderly, massive campaigns against smoking and use of drugs, certainly the frightening growth of older age groups will pose new structural limits to the population [12].

It is undeniable, in fact, that a large amount of pathologies that are spreading in recent years are closely related to age, and the growth of this will not only bring with it the growth and spread of diseases today marginal if not, indeed, unknown.

This lot will commit the future governance, on the identification of resources to cope with this situation and the migratory flows in the next few decades could be the key to restore vitality to a population particularly in trouble [13].

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