

The demographic transition of the Catholic Church's cardinals (1900-2020)

MARCANTONIO CALTABIANO * ,
GIANPIERO DALLA ZUANNA **

* Università di Messina, ** Università di Padova

1. Introduction

Cardinals are the selected leadership group of the Catholic Church¹. Almost always chosen among the bishops, they are appointed for life by the pope, with whom they collaborate closely in the making of pastoral and government decisions. When the pope dies or resigns, a new pope is elected – with a secret vote and a two-thirds majority – by the cardinals gathered in a papal conclave in the Vatican State, within the Sistine Chapel under the vault painted by Michelangelo.

Today, the cardinals hail from five continents, but this has not always been the case, even in relatively recent times. When Pius X became pope in 1903, the College of Cardinals was made up of 64 cardinals, only 2 of whom were not European (one from Baltimore, US, and the other from Sidney, Australia). The absolute majority was Italian (39), the rest coming from just a few other countries (7 French, 5 Spanish, 5 Austrian-Hungarian, 3 German, 1 Belgian, 1 Irish, 1 Portuguese). Their average age was 67, and while 5 were over the age of eighty, a clear majority (42) were younger than 70 and 13 were less than 60. Only half were bishops currently leading a diocese, the rest either held positions in the Roman Curia, were former papal ambassadors (apostolic nuncios), or emeritus bishops.

The composition of the Cardinal College in early 2020 is entirely different, comprising 223 cardinals, 99 of whom are over the age of 80. The number of possible electors of the pope equals 124, following Pope Paul VI's *motu proprio* (papal decree) *Ingravescentem Aetatem* (Advancing Age), which in 1970 established that cardinals older than 80 cannot participate in the conclave to elect the new pope. Despite this exclusion, the average age of the cardinal electors has risen over time to 72, five more than at the beginning of the twentieth century: of these 124 electors, only 32 are under the age of 70 and 6 are less than 60. Compared to the 1903 conclave, the number of cardinal electors engaged in the Roman Curia has not changed, although those holding territorial positions has tripled (81 currently in office, 11 recently became emeritus)². In addition, the cardinal electors are double in number compared to the early 20th century. The same Paul VI, with the promulgation of the *Romano Pontifici Eligendo* (Apostolic Constitution governing the election of popes) in 1975, fixed the number of cardinal electors at around 120. Among the 124 voters at the beginning of 2020, 22 are Italian, 25 European non-Italians, and 77 non-European. Almost half (56) of the cardinal electors come from Latin

America, Africa, and Asia (henceforth labelled Less Developed Regions [LDR], as opposed to the More Developed Regions [MDR], following the definitions of the UN Population Division).

Detailed demographic data is available on cardinals over a considerable period of time. Indeed, since the 15th century, we know the place of origin, date of birth, appointment, and death for each cardinal. In what follows, we build on the work of Fornasin, Breschi and Manfredini (2010), who analyze the demographic characteristics of the College of Cardinals between 1585 and 1955. We focus in particular on the evolution of the latter over the 20th and 21st centuries, outlining the demographic transition experienced during this time by the cardinals, in a setting of extraordinary increases in survival of the élites and a rise in the population living in the LDR compared to the MDR.

First, we observe how the nomination strategies implemented by the elected popes between the end of 1903 and early 2020 have changed; in part due to efforts to adapt the College of Cardinals to shifts in the Catholic population and the mortality regime, in part according to their respective visions of Catholic Church governance. Second, we analyze transformation in the survival of the cardinals, comparing the latter to that of their contemporaries. We also show how the population of cardinal electors has once more become stationary, after the “upheavals” induced by Paul VI (1963-1978). Finally, we study alterations in the geography of the College of Cardinals, in light of geo-demographic change of the Catholic Church and its clergy.

2. Age at appointment and number of appointments

In just over a century, the composition of the College of Cardinal electors has profoundly changed in number, age, geography, and positions. To this regard, table 1 provides an overview of the ways that the “demographic” strategies implemented in the appointment of cardinals have changed over the past 120 years. The first three popes of the 20th century employed similar appointment methods: four or five new cardinals each year, who were on average 61 years of age. It was enough to maintain the Sacred College at around 60/65 individuals, with an overall average age of 67. During this period, there were relatively few cardinals over age 80 (five at the 1904 conclave, four at the 1914 conclave, six at the 1922 conclave, five at the 1939 conclave). The average age of 61 at appointment reflected a peak in secular growth: from the mid-17th to the mid-18th century, the average age at appointment rose from 40 to 50, and then from 1750 to 1900 from 50 to 60 (Fornasin, Breschi and Manfredini 2010).

The actions of Pius XII further increased the average age at appointment. The pope’s nominations of new cardinals were so few during his long reign (1939-1958) that the 1958 conclave was composed of just 53 cardinals whose average age equalled 73, indubitably drawn upwards by the presence of 12 cardinals over the age of 80. While John XXIII and Paul VI similarly continued to push the average age of cardinals higher in the later decades of the 20th century, they also increased the pace of appointments, reaching an average of nine or ten new cardinals a year. The College of Cardinals consequently became increasingly large,

reaching 82 units (including 20 over the age of 80) at the conclave of 1963 and then 114 under the age of 80 at that of 1978 when, for the first time, the over-80 were not electors. The conclaves that elected John Paul I and John Paul II in 1978 were the youngest of the entire 20th century, because Paul VI – in addition to excluding cardinals over the age of 80 from the active electorate – continuously increased the number of new cardinals in order to reach the number of 120 voters, which he himself had established. While John Paul I, who reigned just 33 days, did not have time to nominate any cardinals, John Paul II slowed the pace of appointments somewhat during his long pontificate, though the average age at appointment remained stable. Benedict XVI and, especially, Francis, then not only accelerated the pace of appointments, but further raised their average age to between the ages of 65-70.

Tab. 1. *Appointment of cardinals by popes reigning in the 20th and 21st centuries*

Popes and number of years in office	Voting cardinals at the time of the conclave			Appointments of cardinals under the age of 80			
	N	Mean age	(*)	N	N per Year	Mean age at appointment	(^)
Pius X (1903-1914 – 11.0)	64	67	98%	49	4.5	61.0	0.127
Benedict XV (1914-1922 – 7.4)	65	66	68%	32	4.3	61.3	0.140
Pius XI (1922-1939 – 17.0)	61	68	46%	76	4.5	60.2	0.134
Pius XII (1939-1958 – 19.6)	64	67	81%	52	2.7	62.8	0.138
John XXIII (1958-1963 – 4.7)	53	73	75%	50	10.6	66.4	0.128
Paul VI (1963-1978 – 15.2)	82	73	55%	137	9.0	62.2	0.129
John Paul II (1978-2005 – 27.5)	114	66	89%	208	7.6	65.6	0.107
Benedict XVI (2005-2013 – 7.9)	117	72	98%	74	9.4	67.7	0.090
Francis (2013-2019 – 5.9)	117	72	57%	70	11.9	67.5	0.092
Situation on 1.1.2020	124	72	53%	---	---	---	---

(*) Voters appointed by the previous pope. For 1.1.2020: voters nominated by Pope Francis. Pope Leo XIII, the predecessor of Pius X, reigned for twenty-five years.

(^) Variation in age at appointment, measured by the coefficient of variation (ratio between standard deviation and arithmetic mean).

Source: our database on the cardinals of the 20th and 21st centuries.

Crucially, by combining three “demographic” guidelines (average age at appointment of 67.5 years, a dozen new entries every year, and low mortality), the most recent popes have been able to respect the rule of a capped number of cardinal electors oscillating at around 120 units.

3. The mortality of a population that becomes again stationary

Knowledge of the date of birth, appointment, and death for all the cardinals appointed between November 9, 1903 (first consistory of Pope Pius X)³ and December 31, 2019, allows to study their mortality through cohort life tables (see Appendix). Specifically, we compare the survival of the cardinals with that of Italian males of the same ages. The choice of Italy as a comparison term is appropriate as many cardinals, especially those born during the 19th century, served in Rome. It is also possible to extend the comparison for the last cohort to the survival of Italian male graduates (tables 2a, 2b and 3).

Tab. 2a. *Mortality indicators for cardinals and Italian males of the same age*

Birth cohort	Life tables for cardinals			
	< 1885	1885-1914	1915-1934	1935+
Average calendar year at 70th birthday	1950	1970	1995	2012
10^9q_{50}	41.9	84.6	20.5	0.0
10^9q_{60}	391.0	147.5	96.4	18.2
10^9q_{70}	622.9	386.9	183.0	175.0
10^9q_{80}	849.2	685.9	541.8	---
e_{50}	23.0	27.9	34.3	---
e_{60}	13.7	19.8	24.9	---
e_{70}	9.2	12.4	16.9	---
e_{80}	6.3	7.1	9.4	---
N	201	210	229	178

Source: our database on the cardinals of the 20th and 21st centuries.

Tab. 2b. *Mortality indicators for cardinals and Italian males of the same age*

Calendar year	Period life tables for Italian males						
	1930-1932	1950-1953	1970-1972	1995	2012	2012 graduate	2019
10^9q_{50}	137.5	122.1	106.9	67.4	43.2	25.3	37.2
10^9q_{60}	286.0	253.1	248.1	178.9	112.4	75.4	96.5
10^9q_{70}	594.7	556.8	514.2	400.8	280.8	214.0	244.6
10^9q_{80}	898.2	890.8	831.0	734.3	673.0	611.1	609.5
e_{50}	22.5	23.5	24.4	27.8	31.3	33.7	32.6
e_{60}	15.2	16.0	16.7	19.4	22.4	24.4	23.6
e_{70}	9.1	9.6	10.3	12.4	14.5	15.9	15.5
e_{80}	4.9	5.0	5.8	7.1	8.0	8.6	8.7

Source: Istat life tables, several years.

The small group of cardinals, unfortunately, precludes the construction of other detailed life tables, for example, by place of birth or residence at time of appointment. Moreover, many cardinals spent long periods of their lives in different places (in Rome or elsewhere). That said, to observe the evolution over time of the geography of cardinal mortality, we regress their age at death on their year of birth, their place of birth, and age at the appointment, using the Cox semi-parametric model (figure 1; detailed results available on request).

The mortality of cardinals born before 1885 is slightly higher than that of their Italian peers. This result is in line with the observations of Fornasin, Breschi and Manfredini (2010), who, through period life tables, compare the mortality of cardinals with that of males in several European states between 1750 and 1940. These authors find a similar e_{60} between cardinals and common people until 1840, which was then lower for cardinals in the following century.

Tab. 3. Comparison between the mortality of cardinals and Italian males of the same age

	Birth cohort				
	< 1885	1885-1914	1915-1934	1935+	1935+
	Average calendar year at 70th birthday				
	Calendar year of period life table for Italian males				
	1950	1970	1995	2012	2012 graduate
	$q_{card}/m q_{ita} \times 100$				
${}_{10}q_{50}$	34	79	30	---	---
${}_{10}q_{60}$	154	59	54	16	24
${}_{10}q_{70}$	112	75	46	63	82
${}_{10}q_{80}$	95	82	74	---	---
	Difference $e_{card} - m e_{ita}$				
e_{50}	-0.5	3.5	6.5	---	---
e_{60}	-2.3	3.1	5.5	---	---
e_{70}	-0.4	2.1	4.5	---	---
e_{80}	1.3	1.3	2.3	---	---

Source: our database on the cardinals of the 20th and 21st centuries and Istat life tables, several years.

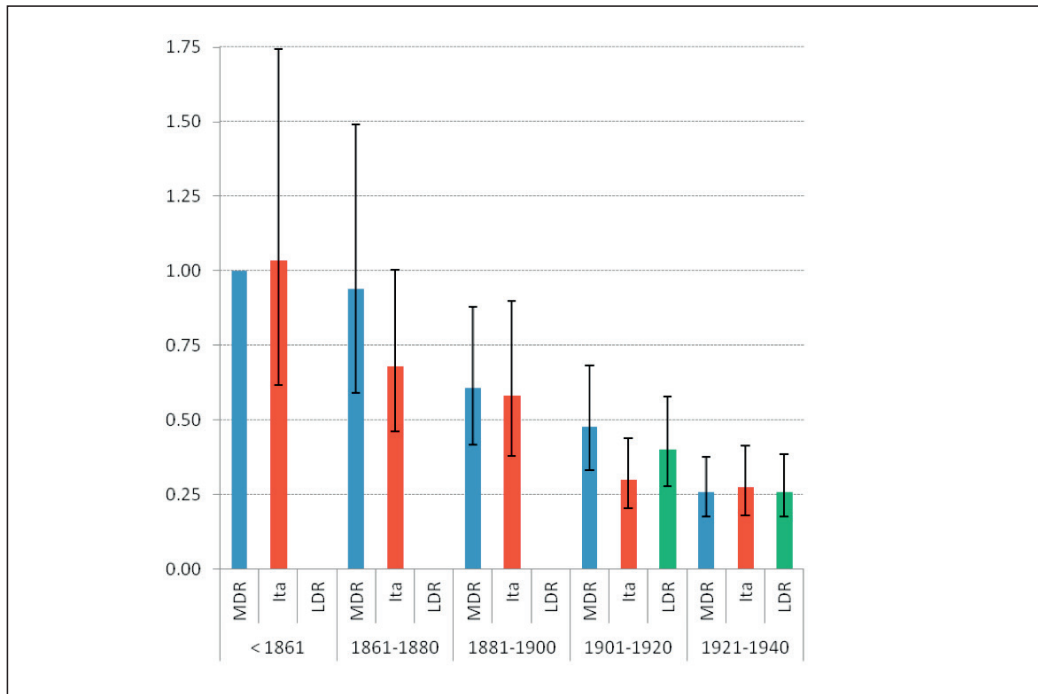
This result contrasts with findings from survival comparisons between élites and European peoples; see, for example, Deaton (2013, figure 2.3) and Stelter, de la Croix and Myrskylä (2021). In an extensive study on this issue, de la Croix and Licandro (2015) show that a survival “gap” in favour of the élites systematically and significantly widens beginning with the cohorts born in the decade 1640-1650. As most of the cardinals born before 1885 were of noble origin or came from wealthy families, how might this surprising result be interpreted? Fornasin, Breschi and Manfredini (2010) consider three explanations to be plausible, after excluding others.

- (1) The more remarkable survival of the European élites up until the first half of the 20th century was particularly concentrated in the first decades of life. In contrast, over the age of 60 – or the average age of the cardinals appointed in the first half of the 20th century – the survival differences by social class were modest or non-existent (Valkonen 2005). This result is further supported by the results of a study on university professors of the Holy Roman Empire and the Netherlands between the 14th and the 19th century: the recovery of survival from the mid-17th century onwards is entirely concentrated between the ages of 30 and 60 (Stelter, de la Croix and Myrskylä 2021).
- (2) The cardinals' duties could have exposed them to a higher risk of contracting infectious diseases, mainly related to their frequent travel and contact with many people, who usually greeted them by taking their hand and kissing their ring. Thus, even though they formed part of the upper ruling class, the cardinals may have been exposed to significant professional hazards. Their life expectancy could consequently have been affected, much like the findings of Stelter, de la Croix and Myrskylä (2021), who observe that the survival of German and Dutch medical university professors (for the period 1600-1900) is systematically lower than that of their colleagues in other professions. A study by de la Croix and Licandro (2015) similarly shows that, even among the ecclesiastics, cardinals were less favoured, having a lower average age at death than abbots, bishops, or archbishops⁴.
- (3) Most of the cardinals lived in Rome or spent long periods of time there. The city was plagued by the hygiene problems typical of large urban conglomerations; moreover, malarial fevers, which affected mostly the elderly (Corti 1987) were frequent in Rome, at least until the third decade of the 20th century. It is not coincidental that the seasonality of cardinal deaths between 1850 and 1900 coincides with that of the male population over 60 in Lazio in 1873-1875 (Fornasin, Breschi and Manfredini 2010). In addition, studies on ecclesiastical populations of the past show that survival was higher for those who spent their lives in the quiet of a convent, and instead much lower for those who lived among the people (Houdaille 1980; Luy 2003; de la Coix and Licandro 2015).

For the next two cohorts (born in 1885-1914 and 1915-1934), the survival gap relative to their Italian peers rapidly widens, now in favor of the cardinals, reaching as high as 4.5 years of residual life at age 70 (16.9 vs 12.4 for those aged 70 in 1990). The survival of cardinals born in 1915-1934 (aged 70 in 1985-2004) was higher not only compared to Italian males born around 1949 (aged 70 in 2019), but also compared to Italian male graduates born around 1942 (aged 70 in 2012). Indeed, even in 2012, the latter can still be considered a select group, given that they comprise just 9% of their cohort. For the last cohort (cardinals born after 1934, 90% of whom are still alive at the beginning of 2020), survival is still better than that of their Italian peers, even if the “gap” (still wide between ages 50 and 70) at ages 70-79 do not increase with respect to the previous cohort (${}_{10}q_{70}$ is “only” 20% lower than that of Italian graduate peers).

The high levels of survival of the cardinals of the most recent cohorts ($e_{60}>25$) appear even more relevant when recalling that an ever smaller portion of this group

Fig. 1. Cox hazard model: hazard ratio and confidence interval ($p = 0.05$) for birth cohorts of cardinals born in Italy, in MDR, and in LDR



Source: our elaborations on the database on the cardinals of the 20th and 21st centuries.

is from Italy, one of the countries with the highest survival rates of elderly males in the world (${}_m e_{60}=23.5$ in 2015-20 – UN Population Division). While many of these cardinals live in other MDR (${}_m e_{60}=21.4$), an increasing number hail from LDR (${}_m e_{60}=18.2$). For all cohorts of cardinals born after 1881, there are no differences in survival according to place of birth (Italy, MDR, or LDR). For the older cohorts, the survival of the (few) cardinals from LDR is even more favourable than that of their peers from MDR and Italy (table 4 and figure 1).

The high survival levels of cardinals born during the 20th century and the absence of territorial differences during this period aligns with results on the evolution of élites over-60 survival in the past few decades; see, for example, Andreev et al. (2011) for members of Russian and English Academies of Science; Winkler-Dworak and Kaden (2013) for members of the German Academy of Sciences; di Lego, Turra and Cesar (2017) for Brazilian aviation officers serving on the ground. These studies show that, until mid-20th century, the over-60 survival of academic élites did not differ from the general average. However, in the decades that followed, a “gap” with respect to the general population has continuously widened. In fact, academics represent the precursors of this mortality decline, from which the over-60s of all MDR have benefited over the past forty years. For example, at the beginning of the 21st century, for members of the Saxon Academy of Sciences and Humanities in Leipzig $e_{60}=25$ years (compared to $e_{60}=20$ for German males),

the same level and deviation between Italian males and cardinals born in 1915-1934 (Winkler-Dworak and Kaden 2013). These authors also note that the over-60 survival differences between academics residing in East and West Germany born in 1875-1911 are not statistically significant, although in the second half of the 20th century the survival of the elderly was higher in West Germany than in East Germany. Even among the Brazilian aviation officers, there are no differences in survival between those born in the northern or southern states of the country, which instead see significant mortality differences when considering the whole population. As observed, among the cardinals as well, place of origin seemingly has little influence on the chances of survival.

Winkler-Dworak and Kaden (2013) suggest three hypotheses (not in competition) to explain these survival gains of the élite, which adapt well to our case.

(1) Cardinals could be a selected category with respect to better health conditions; a hypothesis that seems plausible. Indeed, the appointment of bishops, among whom cardinals are almost always chosen, is subject to much scrutiny, including considerations regarding their health. The main documents that govern the appointment of Catholic bishops in 2020 are articles 375-380 of the 1983 Code of Canon Law and the *Normae de promovendis ad Episcopatum in Ecclesia Latina* (Criteria for the appointment of bishops of the Catholic Church), promulgated by the Holy See on March 25, 1972. These criteria explicitly affirm that a potential candidate for the episcopate will be excluded from the list «for advancing age, illness, or other reasons». In confidential conversations, we learned that when the nuncio (Vatican ambassador) in a given country begins the process of identifying a possible bishop, he sends 30 to 60 strictly private questionnaires to individuals who know the candidate in question. The survey consists of 12 questions, one of which explicitly concerns the state of health, asking, among other things, if within the candidate's family there are people with serious hereditary diseases. A person with grave health issues is not considered suitable. Exceptionally, however, popes have chosen a candidate even where the latter was excluded by the nuncio for health reasons. An example is that of Don Albino Luciani, who was chosen directly by the pope as Bishop of Vittorio Veneto (Italy), later became the Patriarch of Venice, and then pope on August 26, 1978 with the name of John Paul I; he died suddenly at just 66 years of age, after 33 days of reign.

Following Winkler-Dworak and Kaden (2013), we conducted a sensitivity analysis, including the age at appointment in the previously estimated Cox model, which positively correlates with the probability of survival (detailed results available on request). The risk of death of cardinals appointed at an older age is lower (obviously from that age onwards) than is the risk of death of cardinals appointed at a younger age. This would support the idea that their health conditions are also considered when choosing new candidates.

(2) Cardinals may have enjoyed good material conditions in their pre-appointment lives, combined with an avoidance of risky behaviour (e.g., smoking, excessive drinking, drug use, etc.). This hypothesis is also credible. Indeed, those who regularly attend religious services have a significantly lower risk of death than

do non-religious people (see for example Li *et al.* 2016; Idler *et al.* 2017), and smoke less frequently (Hussain, Walker and Moon 2019). Furthermore, during training within seminaries and convents – where most spent their adolescence – the cardinal's nutritional intake was often comparatively better than that of ordinary people (Luy 2003). Excesses in smoking and alcohol drinking were also strongly discouraged, potentially even leading to the expulsion of the candidate. Indeed, for reasons also related to priestly functions, those who suffer from alcohol dependence are not permitted to become Catholic priests⁵. Finally, as mentioned, the habits of candidates are considered in the process of selecting bishops; leading a life of moderation forms part of «the human virtues and other qualities that make a suitable candidate for the episcopate» (Canon Law 378). As far as we know, however, no research has been conducted on the more or less healthy conditions of the Catholic clergy and bishops. An exception is Rossetti's (2011) study on the US Catholic clergy, which shows that this group's level of obesity (mild and severe) does not differ significantly from that of the average American citizen⁶.

- (3) Finally, those who rise to the office of cardinal might then have access to material conditions and a mental state favourable to survival. The Italian politician Giulio Andreotti – who died in 2013 at the age of 94, after having been prime minister seven times, minister thirty-two times, and sitting in the Italian Parliament for seventy-eight consecutive years – provides a striking aphorism, which well sums up this idea: «Power wears out those who do not have it». Like the preceding two hypotheses, this theory is also reasonable. Stelter, de la Croix and Myrskylä (2021) show that members of Academics survive longer than the community of university professors to which they belong, although they do not exclude that this difference is due more to selection by appointment than to a “leap” in status. As for contemporary cardinals, the negative conditions linked to the status of previous cohorts have largely disappeared; while cardinals continue to travel extensively, meet many people, and live or spend long periods in Rome, travel is now much more comfortable, coming into contact with many people is less risky to one's health, and in Rome (where malaria has long since disappeared) climatic conditions are excellent and the quality of urban life is in line with the best MDR standards. In addition, cardinals lead comfortable lives, and benefit from the best medical care available in the country where they live. Finally, even if, like all bishops, cardinals resign from their office at the age of 75 in accordance with canonical law, as *emeriti* they generally continue to engage in mentally demanding and fulfilling activities, without, however, the stress connected to government responsibilities.

Today, a cardinal's risk of dying between appointment (on average at 67.5 years) and exit from the conclave (80 years) is less than 20%. This, combined with the appointment rate of the most recent popes, has transformed the cardinal electorate into a stationary population: their average age is constant around 72 years, as is the annual number of entries (around ten per year) and exits (seven or eight due to 80th birthday, two or three due to death before age 80). Thus, after a period of “demographic transition” during the pontificate of Paul VI, in the first decades of

the 21st century a new stationary population has been established, with different numbers and rules of entry and exit.

4. Towards an increasingly international College of Cardinals

From a geo-political point of view, perhaps the most interesting change in the composition of the College of Cardinals has been its progressive internationalization (table 4). Recall that in the first half of the 20th century, almost all nominations of new cardinals concerned bishops of the MDR, with a strong Italian presence. A shift began with Pius XII, who appointed a greater number of cardinals from Latin America. Though John XXIII maintained the previous approach, even accentuating the nominations of Italian cardinals, a true turning point came with Paul VI, who during his pontificate appointed 40 cardinal electors from the LDR (28% of appointments). The next two popes continued along these lines. We then observe notable further diversification under Pope Francis, where half of the appointed cardinal electors hail from Africa (12), Asia (13) or (especially) Latin America (19), leading to a nomination of new Italian cardinals that falls below 20% (14).

The variegation introduced by Pope Francis is all the more evident when looking at the episcopal see where the appointed cardinal electors operate. First, 13 of the 88 new voters come from countries where, in the 20th and 21st centuries (and often also in the previous centuries), there has never been before a cardinal; moreover, many appointments in other countries concern dioceses that have not been cardinal offices in recent times. While John XXIII and Paul VI also appointed many cardinals in new dioceses and countries, the latter took place during the stage in which the cardinal electors increased in number from 60 to 120. Indeed, Pope Francis' choices resound more strongly, as the limit of 120 cardinal electors means that a new appointment necessarily excludes a diocese that has traditionally been a cardinal seat.

Such transformation in cardinal appointments has at least in part accompanied changes in the composition of the Catholic population (here understood as baptized individuals). Between 1970 and 2017, the number of Catholics in the world doubled, rising from 653 million to one billion 312 million (table 5, A and B); according to the UN Population Division, this is proportionally the same growth pace of the world population. Therefore, the doubling of the number of cardinal electors during the same 47 years has allowed to maintain one cardinal elector for every 10 million Catholics (Caltabiano and Dalla Zuanna 2020). During this same period, the distribution of Catholics has changed according to the area of the world. Specifically, the proportion of Catholics living in the MDR has declined from 49% in 1970 to 29% in 2017; at the same time, the population of these regions has also diminished from 27 to 18% of the world population. The proportion of Catholics in the MDR will likely continue to decrease in the coming years due to strong population growth in the LDR, especially in sub-Saharan Africa.

Tab. 4. *Cardinals under age 80 nominated by the popes reigning in the 20th and 21st centuries, by country of origin*

Popes and number of years in office	N	Row percentages					Total	% LDR
		Africa	Latin America	Asia	MDR excl. Ita (*)	Italy		
Pius X (1903-1914 – 11.0)	50	0	2	0	58	40	100	2
Benedict XV (1914-1922 – 7.4)	32	3	0	0	41	56	100	3
Pius XI (1922-1939 – 17.0)	76	0	3	1	38	58	100	4
Pius XII (1939-1958 – 19.6)	56	2	16	4	54	25	100	21
John XXIII (1958-1963 – 4.7)	52	2	12	6	37	44	100	19
Paul VI (1963-1978 – 15.2)	143	8	10	9	44	28	100	28
John Paul II (1978-2005 – 27.5)	231	7	16	10	45	21	100	33
Benedict XVI (2005-2013 – 7.9)	90	9	10	12	40	29	100	31
Francis (2013-2019 – 5.9)	88	14	21	15	34	16	100	50

(*) MDR include Europe, USA, Canada, Japan, Australia and New Zealand.

Source: our database on the cardinals of the 20th and 21st centuries.

The internationalization of the College of Cardinals can be thus seen as an adaptation to the changing geographical composition of the faithful. To measure this phenomenon, we compare the number of new cardinals to that of Catholics present in the different areas of the world (table 5, E). With Paul VI, who greatly increased the number of cardinal electors until they reached the threshold of 120, this indicator assumes very high values for Africa and Asia, thanks to the nominations of several cardinals when the number of Catholics in these areas was still limited. Yet even with Paul VI, the nominations of Latin American cardinals remain proportionally low, compared to the Catholic population.

John Paul II and Benedict XVI operated in a “closed circuit”, so to speak, in that they did not have the possibility of increasing the College of Electors, but could only redistribute the nominations. In this sense, a nomination in a new country necessarily excluded another, in order to respect the cap of 120 voters. Since, as observed above, these two popes nominated around 30% of the new cardinals from the LDR, the intensity of Third World appointments compared to the number of the faithful halved during their pontificates, in comparison to that of Paul VI, the first true architect of the College of Cardinals internationalization. Pope Francis has strongly resumed this push to rebalance the MDR and LDR, mainly giving more adequate cardinal “representation” to the countries of Latin America. To achieve this rapidly, and in light of the numerical constraint of 120 cardinal electors, he has slightly accentuated the frequency of appointments compared to his predecessors, as well as decreased the intensity of appointments from the MDR, especially from Italy. Thanks to these actions (as seen at the beginning of this note) in 2020, 45% of the cardinal electors come from the LDR, compared to a proportion of around

35% in the 2013 conclave. This remains, however, far from a balanced presence, in that Catholics living in the LDR today make up 70% of the total. Moreover, Italian Catholics are also still particularly over-represented, amounting to 22 cardinal electors; if the relationship between cardinals and the baptized was respected (one cardinal elector for every 10 million baptized, and a cap at 120 electors), there should only be 5 or 6 of them. We can also view the appointment strategies of Benedict XVI and Francis from another perspective. Since both popes nominated cardinal electors with an average age of 67.5 years, it can be assumed that these new cardinals were ordained priests at the age of 25-30, in the decade 1965-1975. It is then possible to calculate the probability of becoming a cardinal for the priests ordained around 1970 in different parts of the world (table 5, part F). During the pontificates of both popes, the path to becoming a cardinal was less steep for priests in the LDR, especially if they came from Africa. With Pope Francis, the probability of becoming a cardinal for LDR priests rises considerably: it doubles in Africa, increases sharply in Asia, even triples in Latin America, while the chances for Italian priests decrease.

As we have seen, despite the stringent norms defined by the *Ingravescentem Aetatem* and *Romano Pontifici Eligendo*, a comparison of the appointments of Francis with those of Benedict XVI and John Paul II reveal that a pope can still significantly shape the College of Cardinals, while maintaining the rule of a stationary population for the cardinal electorate.

This is a consequence of the rate of turnover, determined by the combination of high age at appointment and exclusion from the active electorate at age 80, which, in practice, cancels out the effect of the extraordinary increase in survival. Indeed, a wise use of the 120 cardinal limit – which at first glance might seem to constrain the will of the pope – may in reality allow the Bishop of Rome to adapt the College of Cardinals to his own ideas of Church government.

Beyond, however, the vision of the pope, there is indubitably a need to take into account the demographic structural changes taking place among Catholics and the Catholic clergy. The proportion of Catholics in the LDR has reached 70%, and is expected to increase for demographic reasons, at least for the next few decades. Furthermore, the concentration of the Catholic clergy in these countries has been even more rapid, due also to the scarcity of priestly vocations in MDR (table 5, C and D). In 2017, 69% of priestly ordinations took place in the LDR, compared to just 24% in 1970. While in 1970 the number of ordinations in Italy was higher than the sum of ordinations in Asia and Africa, in 2017, ordinations in Italy were less than a ninth of those in Asia and Africa.

Hence, the future may see an ever less Italian and Western College of Cardinals, increasingly capable of bringing the sentiments expressed by Catholics living in countries across the world to the governance of the Catholic Church.

The demographic transition of the Catholic Church's cardinals (1900-2020)

Tab. 5. Catholics, priestly ordinations, and some indicators of the appointment of cardinals by major geographical area, 1970-2020

	Africa	Latin America	Asia	MDR excl. Ita (*)	Italy	Total	LDR	MDR
(A)	Number of Catholics (millions)							
1970	40	240	50	273	50	653	330	323
1995	107	414	101	311	56	989	622	367
2009	179	498	125	320	57	1,179	802	377
2017	234	548	145	328	58	1,313	927	386
(B)	Number of Catholics (row percentages)							
1970	6	37	8	42	8	100	51	49
1995	11	42	10	31	6	100	63	37
2009	15	42	11	27	5	100	68	32
2017	18	42	11	25	4	100	71	29
(C)	Number of priestly ordinations							
1970	197	414	508	2,805	698	4,622	1,119	3,503
1995	939	1,454	1,041	2,477	533	6,444	3,434	3,010
2009	1,472	1,725	1,246	1,818	405	6,666	4,443	2,223
2017	1,462	1,326	1,230	1,489	308	5,815	4,018	1,797
(D)	Number of priestly ordinations (row percentages)							
1970	4	9	11	61	15	100	24	76
1995	15	23	16	38	8	100	53	47
2009	22	26	19	27	6	100	67	33
2017	25	23	21	26	5	100	69	31
(E)	Index of cardinals' appointments compared to the number of Catholics (*)							
Paul VI	19.7	4.1	17.1	15.2	52.6	14.4	8.0	21.0
John Paul II	5.8	3.2	8.6	12.3	31.8	8.5	4.5	15.3
Benedict XVI	5.7	2.3	11.1	14.2	57.7	9.7	4.4	20.8
Francis	8.9	5.9	15.4	15.5	41.6	11.5	8.2	19.3
(F)	Probability of being appointed cardinal < age 80 for a priest ordained in 1970 (^)							
Benedict XVI	5.1	2.8	2.7	1.6	4.7	2.5	3.2	2.2
Francis	10.3	7.8	4.3	1.8	3.4	3.2	6.7	2.1

(*) 1.000 x ratio between the number of new cardinals under age 80 and the number of Catholics in each area (in millions), standardized for the number of years of the pope's reign.

(^) 1.000 x ratio between the number of new cardinals under age 80 and the number of priests ordained in 1970, standardized for the number of years of the pope's reign.

Source: *Annuario Statisticum Ecclesiae*, several years, and our database on the cardinals of the 20th and 21st centuries.

5. Conclusions

In the first half of the 20th century, the cardinals of the Holy Roman Church were a stationary population, with an average age at the appointment of 61 years. Since their mortality was similar to that of the average Italian men, few of them reached their 80th birthday. Consequently, by appointing 4-5 new cardinals a year, the popes maintained a Sacred College oscillating between 50 and 60 units, corresponding to one cardinal for every 10 million Catholics. Most of the cardinals came from the MDR, and many of them were Italians.

From the mid-20th century things change. First of all, the survival of cardinals begins to rapidly increase, becoming in 2019 significantly higher than that of Italian men holding a degree, with $e_{60}=25$ years and $e_{70}=17$ years, with minimal territorial differences, as observed in the same period in other élite groups all around the world. Secondly, also in light of the reforms of Paul VI, the number of cardinals increases rapidly, reaching 223 at the beginning of 2020, of which 124 are under 80 years old, and therefore potential electors for a new pope. Finally, compared to the first half of the 20th century, the appointment age also increases, stabilizing at 67-68 years with popes Benedict XVI and Francis.

After the “earthquake” induced by the changes of Paul VI (ceiling of 120 cardinal electors and exclusion from the conclave after the 80th birthday) and the strong increase in survival, the population of cardinal electors in the 21st century has returned to become stationary, with age to the appointment, number and age structure constant over time. Since today most of the cardinals are reaching their 80th birthday, the plenum of cardinals under 80, potential electors of the pope, is almost completely renewed in the space of around fifteen years. But with these “demographic rules”, already ten years after the election of a new pope, two-thirds of the College of cardinal electors (the majority necessary to elect the pope) was appointed by him. This also happened in the first half of the twentieth century, with the difference that at that time, such a turnover was guaranteed by less survival, today by the rule of exclusion from the conclave of over 80s.

But the most profound change that has characterized the College of Cardinals in recent decades is the increasing internationalization, begun by Paul VI and continued with the successive popes, up to the strong push in this direction by Pope Francis. However, compared to the number of baptized Catholics, Italians are still over-represented among the cardinals, and those coming from LDR are under-represented. Since an ever-increasing proportion of new priests and newly baptized come today precisely from LDR, it is likely that this trend will continue in the coming years and decades, and that the Catholic Church will become an increasingly globalized reality.

¹ According to the *Annuarium Statisticum Ecclesiae* (The Statistical yearbook of the Catholic Church), on December 31, 2017 there were one billion, 313 million Catholics in the world, 414,582 priests, 648,910 consecrated women, 5,389 bishops, and 216 cardinals.

² In 1966, Pope Paul VI published the *motu proprio* (papal decree) *Ecclesiae Sanctae* (The Holy Church) with which he established that «all bishops of dioceses and others who are juridically their equals are earnestly requested of their own free will to tender their resignation from office not later than at the completion of their 75th year of age to the competent authority». In 1983, this rule was included in the Code of Canon Law, in article 401.

³ The consistory is the formal meeting of the College of Cardinals called by the pope. On this occasion, the new cardinals are solemnly elevated to the College.

⁴ Another possibility is that, until the 19th century, the higher mortality of cardinals was a consequence of deliberate strategies by the popes. When the majority of the cardinals were an expression of the Italian nobility, and therefore the result of a game of strength between a restrict number of houses, it is possible that the pope, although forced to choose a certain number of cardinals among the “rival” houses, selected the cardinals among the oldest and least healthy of their members, thus limiting the probability of their election as pope.

⁵ «Given the centrality of the celebration of the Eucharist in the life of the priest, candidates for the priesthood who are affected by celiac disease or suffer from alcoholism or similar conditions may not be admitted to Sacred Orders» (Document of the Congregation for the Doctrine of the Faith, 19 June 1995). In 2003, the mention of celiac disease was removed.

⁶ It would be interesting to deepen these studies of the survival of ecclesiastical élite, for example extending the comparison to Catholic bishops and priests, also comparing the survival of the ministers of other Christian churches or other religions, where celibacy does not apply and the role of the clergy can also be very different from the Catholic one. It would be interesting, in particular, to see if the so-called mortality cross-over comes into play (Lynch, Brown and Harmsen 2003): in old age, the age-specific mortality rates of a particularly disadvantaged subpopulation tend to converge and even become lower than those of a more advantaged subpopulation. This is because those arriving in old age from a more disadvantaged subpopulation are usually also more selected for good health.

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Appendix

To compute the mortality tables by birth cohort, we employ biographical data on all cardinals appointed between November 9, 1903, the date of Pope Pius X's first consistory, and October 5, 2019, the last consistory to date. We consider each cardinal's date of birth, appointment, and death (or censorship on December 31, 2019, if still living on that date). Data come from the website <http://cardinals.fiu.edu/cardinals.htm>, and were compiled and updated by Salvador Miranda, former Assistant Director for Collection Management at Florida International University Library of Miami (see Fornasin, Breschi and Manfredini, 2010, for further details on the quality of this source).

Data were further verified using the Vatican City State's official site: https://press.vatican.va/content/salastampa/en/documentation/card_bio_typed.html.

The cardinals elected to the papal throne are considered censored on the day of their election, while the cardinals nominated *in pectore* (i.e., without their name being made public) enter the analysis from the date of the consistory of effective publication of their appointment. Finally, the two cardinals who resigned from office in the period of analysis are considered until their date of death (in any case, excluding them from their time of resignation does not change our estimates significantly).

For each cardinal, we consider, as at risk of death, the period following his appointment, checking whether or not the cardinal was alive at each month of age after appointment (e.g., at 63 years and 3 months, 74 years and 8 months, 82 and 11 months, etc.). We therefore calculated for each of these months of age the average number of cardinals exposed to the risk of dying as half the number of the living between two contiguous months. In addition, we calculated the number of deaths that occurred exactly at a certain age, expressed in years and months.

Then, for each year of age since 35, we calculated the average number of living cardinals (e.g., the living cardinals at age 73 are the sum of those surviving at 73 years and 0 months, 73 years and 1 month, 73 years and 2 months,, 73 years and 10 months, 73 years and 11 months, all divided by 12) and the total number of deaths.

Finally, we calculated the probability of death as the ratio between the number of deaths in each year of age and the average number of the living in each year of age. This procedure is summarized in Tables A1 and A2 for ages 70 and 80 for the cardinals as a whole.

Tab. A1. *Example for age 70*

Exact age in months and years [ym]	70 y	70 y	70 y	70 y	70 y	70 y	70 y	70 y	70 y	70 y	70 y	70 y	70 y	70 y
0 m	1 m	2 m	3 m	4 m	5 m	6 m	7 m	8 m	9 m	10 m	11 m			
Deaths at exact age [y,m] ($d_{[y,m]}$)	4	1	1	2	3	4	1	2	4	0	2			
Living cardinals at exact age [y,m] ($l_{[y,m]}$)	462	463	462	464	462	459	460	462	457	461	465			
Average number of living cardinals at exact age [y,m]:	462.5	462.5	463.0	463.3	462.5	461.0	459.5	461.0	459.5	459.0	463.0	466.0		
$L_{[y,m]} = (l_{[y,m]} + l_{[y,m]+1m}) / 2$														
Sum of deaths at age [y]: $\sum d_{[y,m]}$	24													
Average living cardinals at age [y]: $\sum L_{[y,m]} / 12$	461,875													
Death probability $q_{[y]}$	24 / 461,875 \approx 0.051962													

Source: our database on the cardinals of the 20th and 21st centuries.

Tab. A2. *Example for age 80*

Exact age in months and years [ym]	80 y	80 y	80 y	80 y	80 y	80 y	80 y	80 y	80 y	80 y	80 y	80 y	80 y	80 y
0 m	1 m	2 m	3 m	4 m	5 m	6 m	7 m	8 m	9 m	10 m	11 m			
Deaths at exact age [y,m] ($d_{[y,m]}$)	2	1	2	4	2	1	2	2	6	3	2			
Living cardinals at exact age [y,m] ($l_{[y,m]}$)	387	388	387	379	379	381	379	378	373	370	368			
Average number of living cardinals at exact age [y,m]:	387.5	387.5	383.0	379.0	379.0	380.0	378.5	375.5	371.5	369.0	368.5			
$L_{[y,m]} = (l_{[y,m]} + l_{[y,m]+1m}) / 2$														
Sum of deaths at age [y]: $\sum d_{[y,m]}$	28													
Average living cardinals at age [y]: $\sum L_{[y,m]} / 12$	378,250													
Death probability $q_{[y]}$	28 / 378,250 \approx 0.074025													

Source: our database on the cardinals of the 20th and 21st centuries.

Riassunto

La transizione demografica dei cardinali della Chiesa Cattolica (1900-2020)

Questo articolo presenta i cambiamenti demografici tra i cardinali della Chiesa Cattolica nei secoli XX e XXI. Analizziamo innanzitutto le possibili spiegazioni del maggior aumento della sopravvivenza dei cardinali rispetto al resto della popolazione. Ci soffermiamo poi sulla crescente internazionalizzazione del Sacro Collegio. Infine, mostriamo come – nonostante la bassissima probabilità di morte prima degli ottant’anni – un’attenta combinazione tra età elevata alla nomina (67,5 anni) e limite massimo di 120 cardinali elettori consenta ad ogni nuovo pontefice di rinnovare il Collegio dei Cardinali nel giro di un paio di anni, riuscendo così ad orientare l’elezione del suo successore.

Summary

The demographic transition of the Catholic Church’s cardinals (1900-2020)

This article illustrates the demographic change of the Catholic Church’s cardinals over the course of the 20th and 21st centuries. We focus in particular on (1) a possible explanation for their much more intense increase in survival compared to that experienced by the average population and (2) the strong internationalization of the College of Cardinals. Moreover, despite the very low mortality rate before the 80th birthday, given that only cardinals under the age of 80 can participate in the election of the new bishop of Rome, a strategic combination of a high average age at cardinal appointment (67.5 years), and the legal constraint of a maximum of 120 cardinal electors, enable a new pope to renew the College of Cardinal electors within a period of few years, thus influencing the selection of his successor.

Parole chiave

Cardinali; Chiesa Cattolica; Mortalità delle élite; Tavole di mortalità.

Keywords

Cardinals; Catholic Church; Mortality of Elites; Life tables.