Trends in life expectancy and lifespan variation between Arabs and Jews in Israel, 1982–2016

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Abstract

Israel's continued improvements in life expectancy at birth, currently exceeding 82 years for men and women combined, are coupled with persistent and increasing ethnic disparities in longevity. Substantial differences in life expectancy exist between Israel's Jewish majority population and its disadvantaged Arab minority. Although several studies documented Jewish-Arab differences in life expectancy over time, none has examined trends in lifespan variability. Analyzing vital statistics data from 1982 to 2016, we find that life expectancy increased more rapidly among Jews than among Arabs. By contrast, declines in lifespan variation were greater among Arabs, which nevertheless remains higher relative to their Jewish counterparts. A contour decomposition of those trends reveals two disparate phenomena. First, Jewish-Arab disparities in infant and child mortality have narrowed over the study period. Second, the Arab old-age mortality advantage, which existed in 1982, had reversed by 2016, accounting for much of the widening gap in life expectancy. We discuss possible explanations for the reversal in age-specific mortality inequalities. The narrowing of infant and child mortality differentials between Jews and Arabs may be attributed to improvements in neonatal care and decreasing prevalence of consanguineous marriages among the latter. The disappearance of the Arab old-age mortality advantage may be related to cumulative exposure to social adversity and institutional discrimination over the life course, improvements in data quality over time, or changes in cohort-based mortality selection.

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Introduction

Life expectancy at birth in Israel currently exceeds 82 years for men and women combined, placing it at the vanguard along with a handful of other countries (e.g., Japan, Switzerland, Italy, and Spain) (Central Bureau of Statistics, 2018a). Yet, in spite of the sustained increase in longevity at the national level, Israel also exhibits substantial gaps in life expectancy at birth between its Jewish majority population and its Arab minority, with the latter at a considerable disadvantage (Chernichovsky & Anson, 2005). The Jewish-Arab gap in life expectancy at birth had increased steadily since 1975, reaching 4.0 years among men and 3.4 years among women by 2015 (Central Bureau of Statistics, 2018b).

However, group differences in life expectancy, a central longevity indicator representing the life table mean age at death, reflect only one dimension of inequality in length of life. Over the past two decades, demographers have increasingly been interested in lifespan variation, which complements life expectancy and measures the spread of the age-at-death distribution about its mean (Kannisto, 2000; van Raalte & Caswell, 2013; van Raalte, Sasson, & Martikainen, 2018; Wilmoth & Horiuchi, 1999). Higher lifespan variation may indicate greater heterogeneity in underlying population health as well as greater uncertainty in individuals' time of death (Brown et al., 2012; Edwards, 2013; Sasson, 2016). Past studies have documented greater lifespan variation among US blacks (Firebaugh, Acciai, Noah, Prather, & Nau, 2014) and Hispanics (Lariscy, Nau, Firebaugh, & Hummer, 2016) relative to non-Hispanic whites, and among the less educated relative to college-educated individuals in the US and across Europe (Brown et al., 2012; Permanyer, Spijker, Blanes, & Renteria, 2018; Sasson, 2016; van Raalte et al., 2011, 2012). Overall, these studies have shown that the lifespans of minority and lower SES groups are not only shorter, on average, but also more heterogeneous. To date, no study has documented ethnic differences and trends in lifespan variability in Israel.

Israel's population is predominantly Jewish (75%) with a sizable Arab minority (21%)—most of whom are Muslim (83%) and the remainder Christian (9%) and Druze (8%). The Arab minority is politically, socially, and economically disadvantaged relative to the Jewish majority, a position dating back to the establishment of the State of Israel in 1948 against the backdrop of the ongoing Israeli-Palestinian conflict. On average, Arab citizens and residents of Israel have lower levels of education, income, and wealth (Sa'di, 1995; Sa'di & Lewin-Epstein, 2001; Semyonov & Lewin-Epstein, 2011), all of which are known determinants of health and mortality (Hummer & Lariscy, 2011; Marmot, 2005).

Previous research on Israel's mortality patterns pointed to large disparities in life expectancy between Arabs and Jews, which have widened since the 1990s, especially among men. Among women, the Jewish-Arab gap in life expectancy gap was estimated at 2.3 years in 1985–1989, but had increased by 1.4 years in 2000–2004; among men, the gap had increased by 2.3 years over the same period (Na'amnih, Muhsen, Tarabeia, Saabneh, & Green, 2010). The main causes of death contributing to the gap in life expectancy between Jews and Arabs were heart disease, diabetes, and cancer (Chernichovsky, Bisharat, Bowers, Brill, & Sharony, 2017; Saabneh, 2016). Further decomposition by age has shown that in

1975–1979 mortality differentials at younger ages (under 45) were responsible for 70% of the Arab-Jewish gap in life expectancy among women and for 85% of the gap among men. By 2008–2012, however, Jewish-Arab inequalities in mortality had shifted to older ages (45 and over), which accounted for 79% and 73% of the gap in life expectancy among women and men, respectively (Saabneh, 2016).

Although ethnicity remains a significant predictor of longevity in Israel, perhaps even more so than before, Jewish-Arab inequalities in mortality have thus far received little attention in demographic research. In order to fill this gap, the present study examines trends in life expectancy and lifespan variation among Israeli Arabs and Jews from 1982 to 2016. Using the contour decomposition method (Jdanov, Shkolnikov, van Raalte, & Andreev, 2017), we are able to document group differences in life expectancy and lifespan variation and how those differences had evolved over the study period. Our findings show that whereas the Jewish-Arab gap in life expectancy had increased for both men and women, the gap in lifespan variation narrowed for men; among women, it narrowed substantially until the early 2000s but started to widen again thereafter. In both cases, this was because disparities in old-age mortality had increased whereas disparities in infant and child mortality diminished. We conclude by discussing potential policy implications and future research directions.

Data and Methods

Our analysis is based on vital statistics data provided by the Israel Central Bureau of Statistics. Raw death and midyear population counts were collected, by gender and ethnicity, in single age intervals (0 to 95+) from 1982 to 2016. We grouped together each 5-year period (1982–1986, 1987–1991, …, 2012–2016) because the Arab minority group had fewer deaths. Age-specific mortality rates were smoothed and extended to age 110+ (Camarda, 2012; Thatcher, Kannisto, & Vaupel, 1998).

For each 5-year period, we calculated life expectancy at birth (e_0) and life disparity ($e^\dagger$) by gender and ethnicity. Life disparity, a measure of lifespan variability, is the average number of life years lost at death (Zhang & Vaupel, 2009). We chose this measure for its intuitive interpretation, although it is highly correlated with other indices of lifespan variation and tends to produce similar substantive results (van Raalte & Caswell, 2013).

The contour decomposition method decomposes differences in life table functions between two groups by age (Jdanov et al., 2017). Importantly, the method produces additive components of the life table function (e.g., life expectancy, life disparity), which correspond to the initial differences in age-specific mortality rates as well as to changes in those rates over time. In other words, the sum of age-specific contributions to both the initial difference (T1) and the trend (Δ) equal the age-specific contributions to the difference at time T2.

Here we apply the contour decomposition to the difference in life expectancy and life disparity between Israeli Arabs and Jews, from 1982 to 2016. The results will indicate which age groups had contributed most to the difference between the two groups in 1982, and how changes in age-specific mortality since then have shaped present mortality inequalities.

Results

Jewish-Arab differences in life expectancy at birth

Life expectancy at birth increased for both Arab and Jewish men and women over the past three decades. However, it increase more rapidly in the Jewish population compared to the Arab population of Israel. Consequently, the Jewish-Arab gap in life expectancy at birth had increased substantially since 1982 (Figure 1) for both men (Panel A) and women (Panel B). Among men, the gap was as low as 1.3 years in favor of the Jewish population in 1982 – 1986, but increased to 3.9 years by 2012–2016. Over the same period, the gap similarly widened among women, increasing from 1.9 to 3.2 years. However, whereas the gap increased steadily among men, particularly since the early 2000s, among women it had increased in the 1990s but narrowed again during the last decade.

A contour decomposition of these trends sheds light on how changes in age-specific mortality rates, in each group, have contributed to the overall difference in life expectancy at birth (Figure 2). Among men (Panel A), it appears that in 1982–1986 the Jewish advantage was attributed to lower infant, child, and middle-age mortality. However, these were counterbalanced by an Arab old-age mortality (70 and older) advantage. Over time, Jewish-Arab differences in infant and child mortality had diminished, though still existed in 2012–2016, whereas the old-age Arab mortality advantage had reversed. Currently, most of the 3.9-year Jewish advantage in male life expectancy is attributed to old-age mortality.

The results are substantively similar among women (Panel B), with an initial Jewish advantage in infant and child mortality and an Arab advantage in old-age (80 and older) mortality. By 2012–2016, Arab women had become disadvantaged in nearly all age groups except for the oldest-old (90 and older), causing the gap in life expectancy to nearly double from 1.9 to 3.2 years.

Jewish-Arab differences in life disparity at birth

Trends in life disparity complement those in life expectancy and indicate how much heterogeneity in length of life exists in each gender-ethnicity group. Life disparity, the average number of life years lost at death, declined in all groups over the study period (Figure 3). Among men (Panel A), it declined from 12.0 to 10.4 years for Jews and from 14.2 to 12.0 years for Arabs. Among women (Panel B), it declined from 10.7 to 9.1 years for Jews and from 12.8 to 10.7 for Arabs. One noteworthy exception is that whereas life disparity declined steadily for most groups, among Arab women the downward trend has plateaued in the early 2000s and even reversed slightly in the last decade. Overall, however, the lifespans of Arab and Jewish men and women had become less heterogeneous between 1982–1986 and 2012–2016. Furthermore, in contrast to life expectancy, declines in life disparity were greater among Arabs than among Jews.

Nevertheless, Jewish men and women still exhibit lower levels of lifespan variability compared with their Arab counterparts. Among men, the Jewish-Arab gap in life disparity decreased from 2.2 to 1.6 years; among women, the same gap decreased from 2.1 to 1.6 years. The contour decomposition (Figure 4) reveals that life disparity among Arab men

(Panel A) and women (Panel B) was higher in 1982–1986, because they had higher infant and child mortality but lower old-age mortality compared with the Jewish population. This caused Arab lifespans to be more varied than Jewish lifespans. Over time, the Jewish-Arab gap in life disparity has narrowed because Arabs had become less disadvantaged with respect to infant mortality, but also because they had lost their old-age mortality advantage.

Discussion

Between 1982 and 2016 life expectancy at birth increased for Arab and Jewish men and women in Israel. However, consistent with recent studies (Chernichovsky et al., 2017; Saabneh, 2016), increases in life expectancy were greater among the Jewish population compared with the Arab population, placing the latter at a greater disadvantage. In addition, this study documented trends and group differences in lifespan variation. Our findings suggest that life disparity decreased in all groups since 1982, but more so among Arab men and women. As a result, the Jewish-Arab gap in life disparity has narrowed over the study period.

In the early 1980s, Jewish-Arab differences in both life expectancy and life disparity reflected higher infant and child mortality among Arabs relative to Jews, coupled with an Arab old-age mortality advantage. By 2016, the Arab population had lost its old-age mortality advantage while narrowing the gap in infant and child mortality. The combined effect was an overall widening of the gap in life expectancy and a narrowing of the gap in lifespan variation. These findings underscore the importance of using multiple measures, of both central tendency and spread, in the study of inequalities in length of life.

Over the past three decades, Jewish-Arab mortality inequality in Israel has changed in two important ways. First, the long-standing Jewish-Arab gap in infant and child mortality has narrowed substantially. Infant mortality declined in Israel since the 1950s due to continued improvements in preventive and curative neonatal care, which contributed to a reduction in ethnic disparities (Amitai et al., 2005). In addition, consanguineous marriages, which are associated with greater risk of congenital malformations, have become less prevalent among Muslims in Israel (Sharkia et al., 2008). These factors have likely contributed to the rapid decline in infant mortality experienced by Israeli Arabs, although it remains higher than Jewish infant mortality.

Second, the Arab old-age mortality advantage, which existed in 1982, had reversed by 2016. In contrast to infant and child mortality, old-age mortality is generally attributed to chronic diseases which develop over the life course, often as a result of exposure to social adversity (Dannefer, 2003; Hatch, 2005). Although public healthcare provision is widely accessible to both Arabs and Jews in Israel (Clarfield et al., 2017), Israeli Arabs have worse health outcomes associated with their lower socioeconomic status and greater exposure to traumatic events (Osman & Walsemann, 2013). Furthermore, Israeli Arabs often report suffering from both interpersonal and institutional discrimination, which has been linked to adverse health outcomes in the US (Geronimus, Hicken, Keene, & Bound, 2006), although

similar studies in Israel have thus far been inconclusive (Epel, Kaplan, & Moran, 2010; Osman, Daoud, Thrasher, Bell, & Walsemann, 2018).

Limitations

The trends in life expectancy and life disparity documented in this study are based on period mortality, which combines multiple birth cohorts into a single synthetic cohort. Some caution should be exercised in drawing conclusions. An alternative explanation for the disappearance of the Arab old-age mortality advantage may be associated with data quality. In the US, age misreporting among blacks has been suggested as an explanation for their exceedingly low mortality at ages 85 and older in vital statistics (Preston & Elo, 2006). Others have shown that the black-white mortality crossover persists even when the data are adjusted, and the age in which the crossover occurs tends to increase over time (Fenelon, 2013; Lariscy, 2017; Lynch, Brown, & Harmsen, 2003). Aside from issues related to data quality, the mortality crossover could be explained by cohort-based mortality selection (Masters, 2012). If a birth cohort is subjected to a higher mortality regime throughout its life course, survivors would tend to be especially robust, thus having lower old-age mortality rates than expected (Wrigley-Field, 2014). This explanation has yet to be studied in the Israeli context. However, past Arab cohorts have been exposed to higher mortality and emigration rates during the mass expulsion of 1948 and its aftermath, likely rendering those who have remained in Israel select in various ways.

Conclusion

The Jewish-Arab gap in life expectancy has increased over the past three decades, rendering the Arab population of Israel increasingly disadvantaged. However, underlying this change are two disparate trends. First, the Arab disadvantage in infant and child mortality has decreased over time, contributing to a reduction in ethnic disparities in life expectancy. The rapid decline in Arab infant mortality is possibly related to improvements in neonatal care and declining consanguineous marriages among Muslims. Second, the Arab old-age mortality advantage has reversed and now accounts for most of the gap in life expectancy at birth. Although public healthcare is widely accessible to both Arabs and Jews in Israel, the persistence of ethnic disparities in health may be associated with life-long exposure to social adversity and institutional discrimination experienced by many Israeli Arabs.

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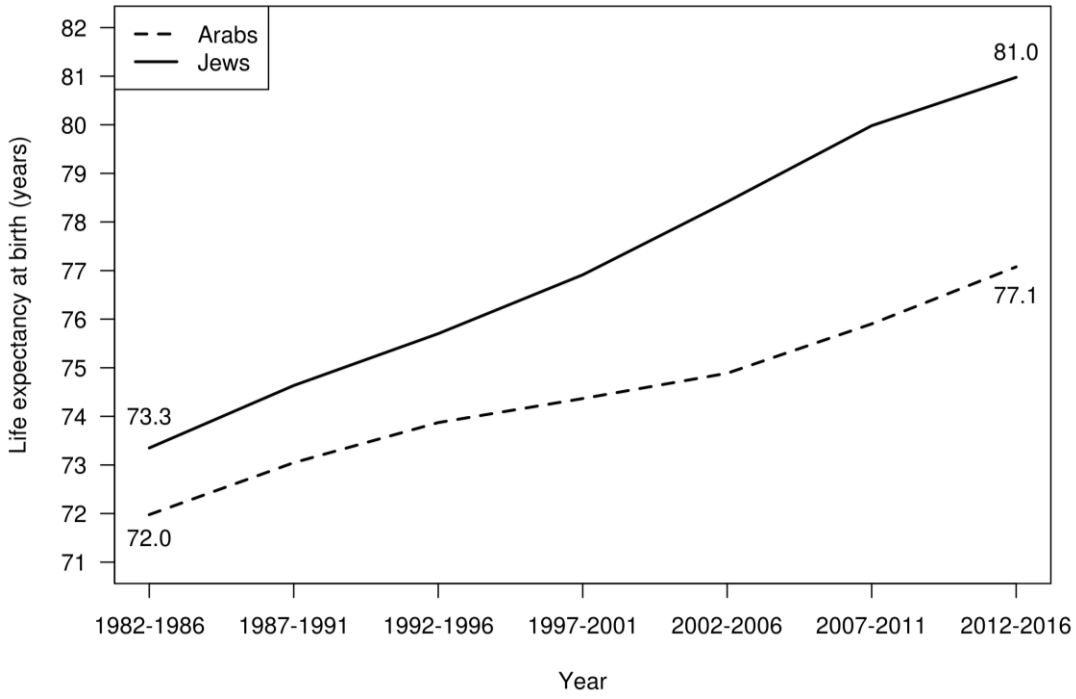
Figure 1. Trends in life expectancy at birth for Israeli Arabs and Jews, 1982–2016.

A. Men



A. Women

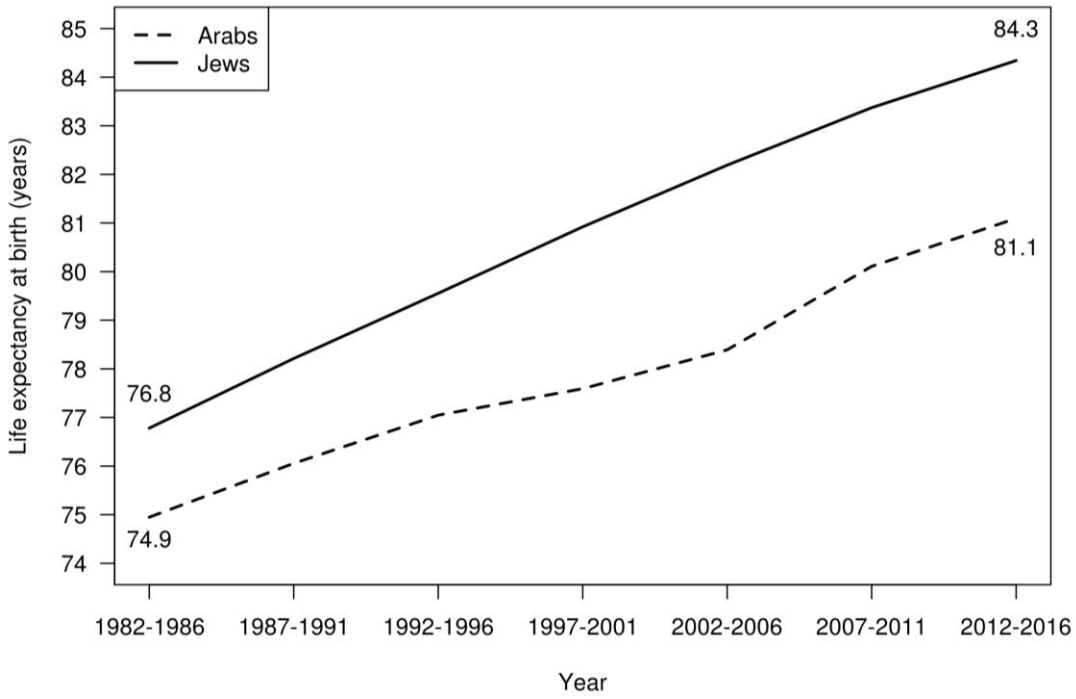
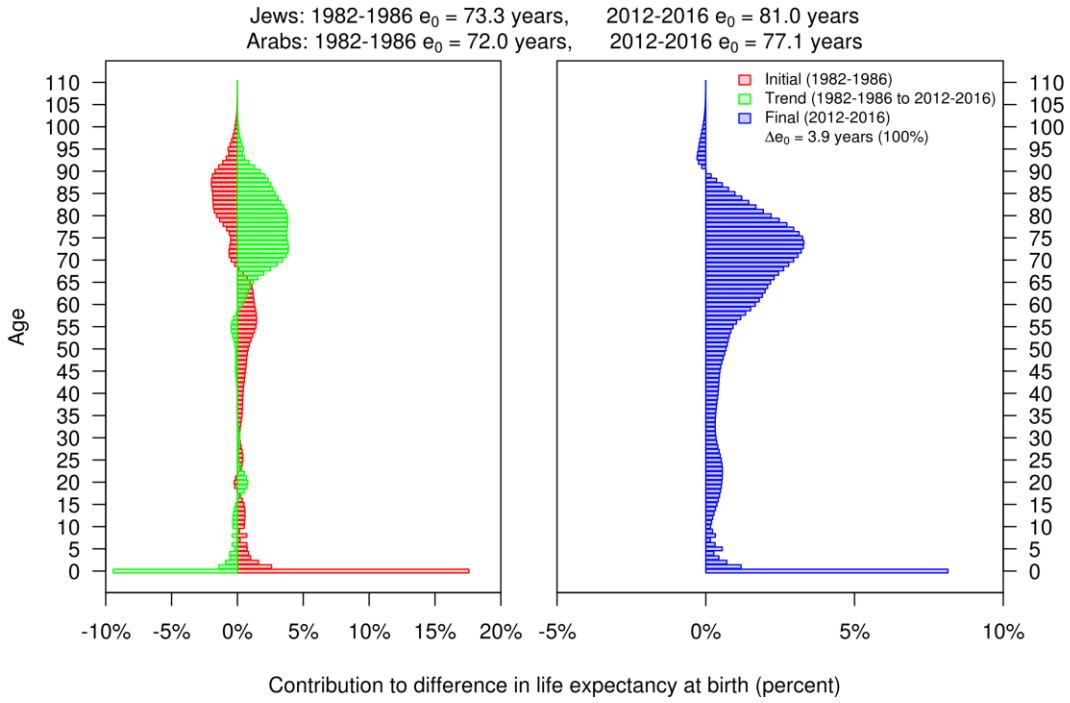


Figure 2. Contour decomposition of change in life expectancy at birth among Israeli Arabs and Jews, 1982–2016.

A. Men



B. Women

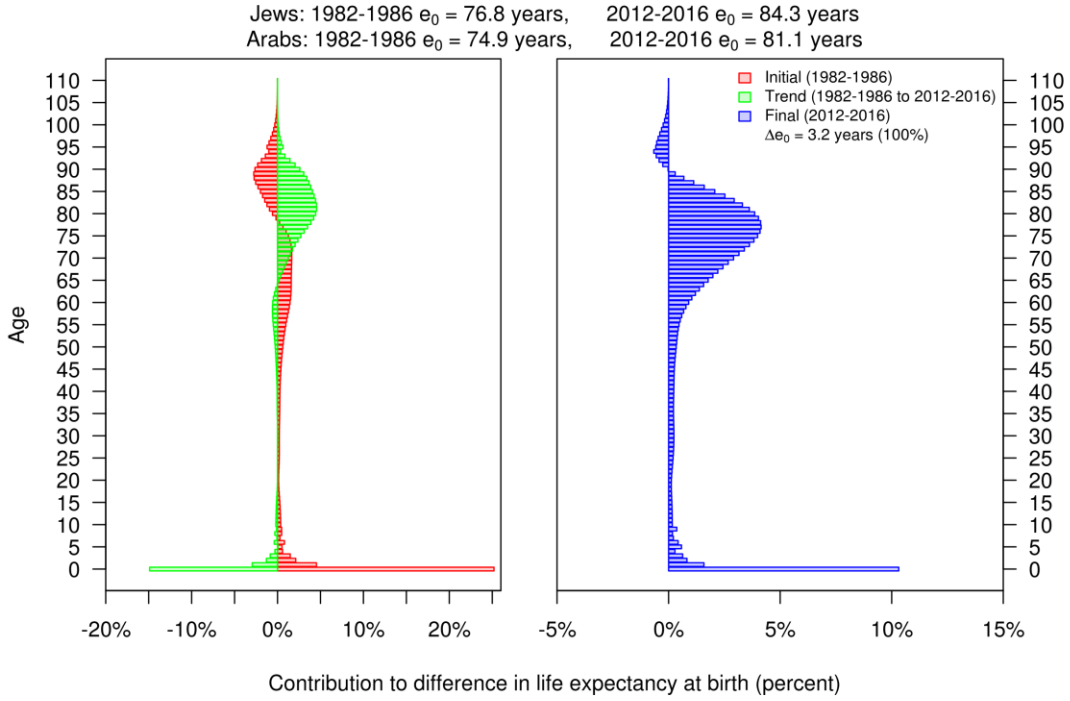
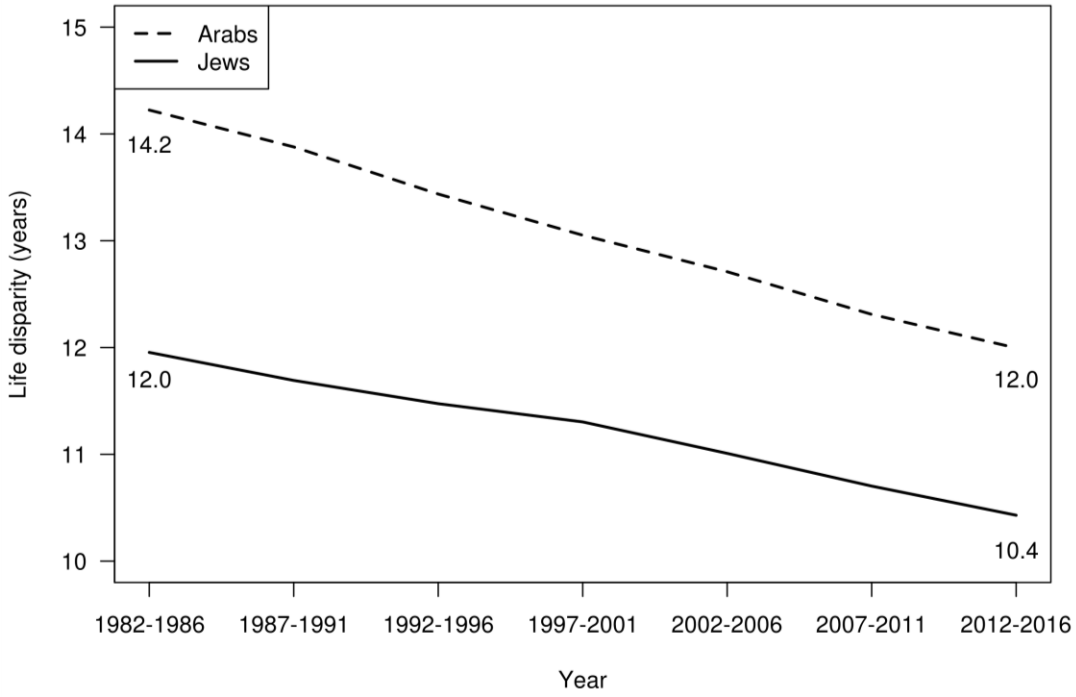


Figure 3. Trends in life disparity at birth for Israeli Arabs and Jews, 1982–2016.

A. Men



B. Women

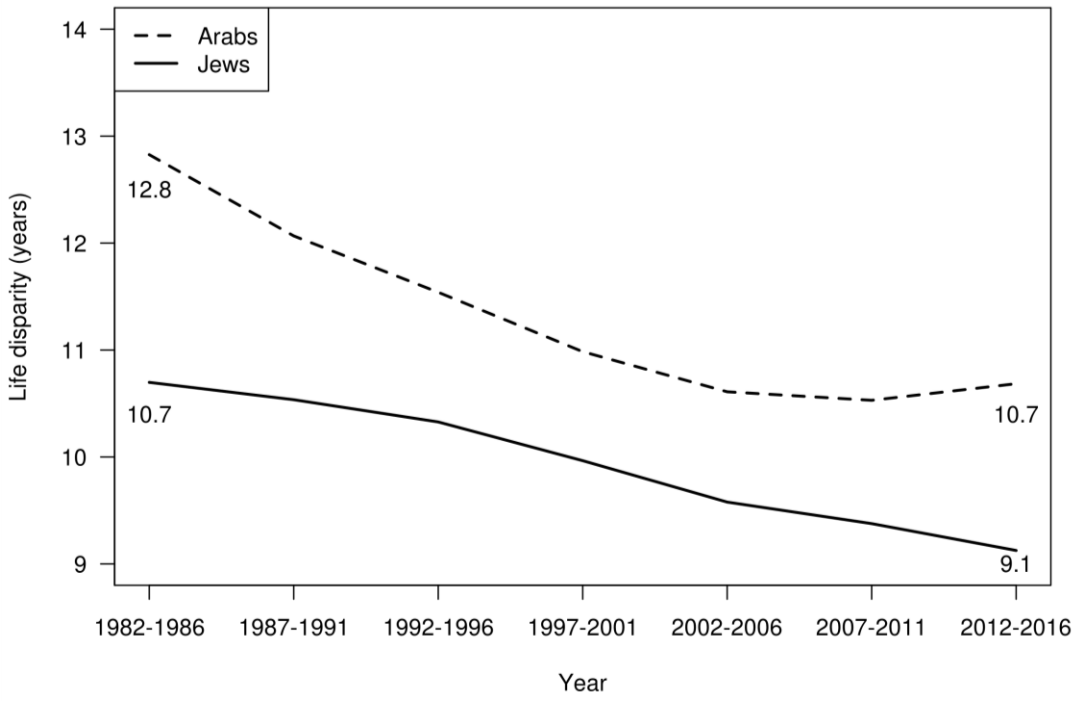
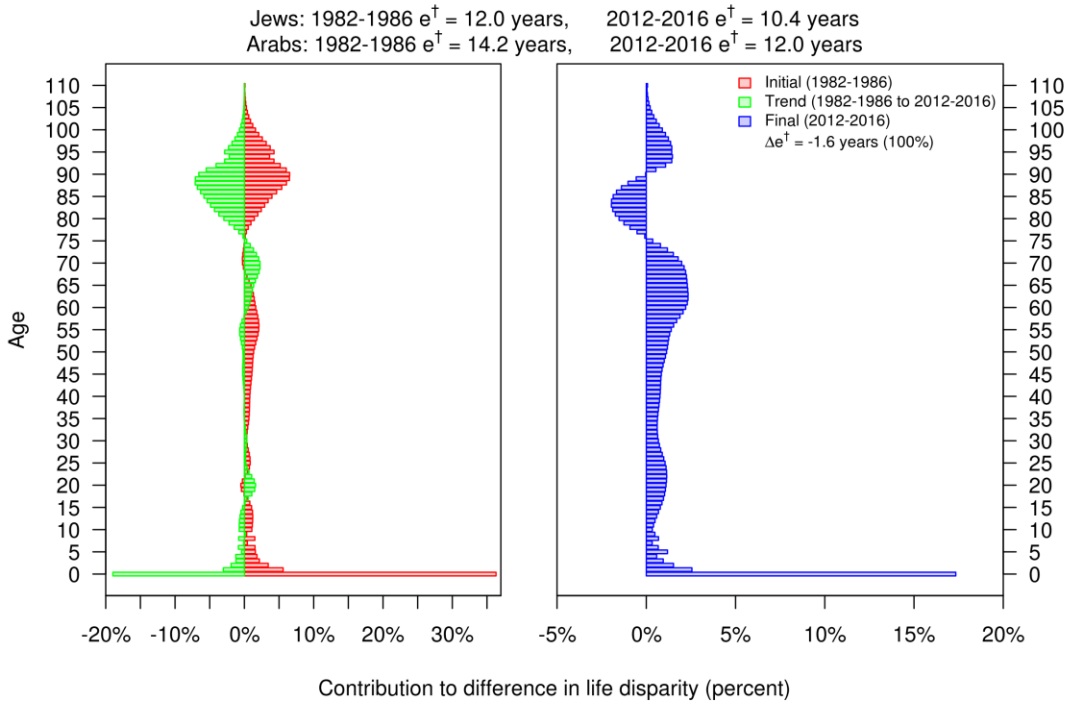


Figure 4. Contour decomposition of change in life disparity at birth among Israeli Arabs and Jews, 1982–2016.

A. Men



B. Women