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Article

Two decades of population change in Saudi Arabia: Exploring effective redistribution strategies

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Abstract: Census 2022 of Saudi Arabia was released recently, with 12 years of intercensal interval. Although it appeared provisional having no reports similar to the 2010 census, efforts to analyze, interpret, disseminate, and discuss were essential for building structures and systems at par with demographic trends and patterns. An analysis was carried out with this census data compared to 2004 and 2010 to track population change—demographic pace, trends, and patterns—over the two decades. Data from all three censuses were analyzed with conventional demographic techniques. A reduction in growth was observed with a declining percentage of the childhood population but with an expanding percentage of the adults (working age) indicating a demographic dividend resulted, mostly, from fertility decline. An aging trend established by the previous censuses was lost, recently: the constriction of the pyramid of 2010 was changed to a different shape. Not only the percentage distribution trends were uneven but also the age-based indices. Thus, these trends revealed a demographic difference to an extent, that demands standardized reports, uniform procedures for the data collection and compilation, and geographic distribution equations. The increasing concentration in urban centers of major administrative areas—Al-Riyadh, Makkah Al-Mokarramah, and the Eastern Region demand redistribution policies. Self-contained townships appear as a strategic option in population redistribution, guaranteeing quality standards and lifestyle.

Keywords: population redistribution; administrative areas; headquarters; population change; geographic distribution

1. Background

Demographics influence values, systems, customs, and traditions impacting marriages and family formation variables apart from economy and development (Al-Hakami and McLaughlin, 2016; Salam 2023; Prskawetz et al., 2007). Thus, the periodic generation of data initiating discussions and deliberations lead to policies and programs as well as goals and targets facilitating service sector actions and distributions at par with needs and demands of changing age-sex distribution patterns and trends (Al-Khraif et al., 2022a, 2022b; Hamanaka, 2017; Hesketh and Xing, 2006; Salam, 2023; WHO, 2013). Saudi Arabia acclaimed as a population at an advanced (late transition) stage has many facets—high living standards, an educated informed population; consolidated pension and income redistribution system; and a stable institutional context that created a credible and sustainable demographic scenario, as explained by Salam and Mini (2024); Lee and Reher (2011); and Kirk (1996). Therefore, the country occupies a unique position in developing countries with an experience of late transition.

Research by James (2011) highlighting the Census of India—2011 demonstrates demographic transition along with opportunities accompanied by demographic dividend, migration, and labor imports as enhancers of human capital development and sex ratio skewing. Such developments are relevant to countries, including Saudi Arabia, along the unprecedentedly rapid demographic change resulting in huge population increase due to fewer births and longer lives resulting in dividend, aging, migration, and urbanization, and thus, the family and household structure, as stated by Bongaarts (2009). Census 2010 of Saudi Arabia has gone through serious discussions for its salient results of significant population growth—especially foreigners; changes in age structure (reducing childhood population and subsequently increasing adult and old aged population); and geographic distribution as a result of dynamics of marriage and fertility, housing, and infrastructure (Khraif et al., 2016; Salam and Mini 2024; Salam et al., 2014; Salam, 2013).

This analysis carried out to track population change in the country sets two objectives: (i) explaining the progress in demographic speed in accordance with the theoretical concepts and (ii) analyzing the population change trends and patterns, over the three census years to facilitate the creation of an environment of information-based policy-making and program designing. Attempts were made to relate demographics with the living arrangements, urbanization, and township developments.

2. Data and methods

This research was an exclusive analysis of 2022 census data, which was recently published online but looks provisional, with permissible comparisons and trend explorations with the 2004 and 2010 censuses. Indicators derived include:

Population change = $Pt2 - Pt1$ [Pt2 is the population at time 2 and Pt1 is the population at time 1]

Annual growth rate = $\left(\frac{LN\left(\frac{Pt2}{Pt1}\right)}{N}\right) \times 100$ [Pt2 is the population at time 2 and Pt1 is the population at time 1 and *N* is the census interval]

Sex ratio = $\left(\frac{Pm}{Pf}\right) \times 100$ [P_m is the number of males and P_f is the number of females]

The population pyramid was drawn by calculating the percentage of males and females, together totaling 100.

Age distribution (years) 0–14, 15–24, 25–49, 50–64, 65+ = $(\frac{Pa}{Pt}) \times 100$ (referring to the percentages in each age group.

Aged-child ratio = $(P60+)/(P < 10) \times 100$ [*P* is the population]

Child-woman ratio = $\left(\frac{P<5}{Pf(15-49)}\right) \times 1000$ [*Pt* is the total population and *Pf* is the female population]

Age dependency ratio = $\left(\frac{P(65+)}{P(15-65)}\right) \times 100$ [P is the population]

Median age = $l + \left(\frac{\frac{N}{2} - \sum fx}{fi}\right) \times n$ [l is the lower limit of the median class; *N* is the total population; $\sum fx$ is the cumulative frequency above the median class; *fi* is the frequency of the median class; and n is the class interval]

Regional Population Change—percentage and broad age group share of the population by administrative areas categorized. Both the natives and others were accounted, separately, for each census year. Each category of administrative area adds up to 100.0. Table created for ease of comparison.

3. Results and discussion

The results of analyses are discussed under two heads.

3.1. Nationwide population change

Saudi Arabian population stood at 32,175,224 as per the recent 2022 census that demonstrate a growth of 9,496,962 from 2004 (22,678,262), in two decades. Decade wise 4,939,068 in 2010–2022 and 4,557,894 in 2004–2010 showing a stalled increase in the latter period, despite a longer duration. These changes could be assessed along with the population categories (native/others) and sex (male/female), decade-wise. That is, a growth of 2,264,922 natives as against 7,232,040 others gives rise to 7,121,255 males against 2,375,607 females, which appears as uneven (**Table 1**). While there was uniform growth of both males and females, in the native population (1,146,761 against 1,118,161), uneven growth was recorded in others (5,974,594 against 1,257,446). The decline in native males in the 2010–2022 period (9,434,131 in 2022 as against 9,575,257 in 2010 giving rise to a reduction of 141,126) could be attributed to counting issues due to census procedures coupled with the emigration of native males for education. Such increases in the others were common in Saudi Arabia and neighboring Arabian Gulf countries.

Table 1. Population changes in the last two decades.

Population/ Period	Change			Annual growth rate			Sex ratio		
	2010–2022	2004–2010	2004–2022	2010–2022	2004–2010	2004–2022	2022	2010	2014
Natives									
Male	−141,126	1,287,887	1,146,761	−0.1	2.4	0.7	-	-	-
Female	156,878	961,283	1,118,161	0.1	1.8	0.7	-	-	-
Total	15,752	2,249,170	2,264,922	0.0	2.1	0.7	101	104	101
Others									
Male	4,288,250	1,686,344	5,974,594	4.5	5.5	4.9			
Female	635,066	622,380	1,257,446	1.9	4.8	2.8	-	-	-
Total	4,923,316	2,308,724	7,232,040	3.8	5.3	4.3	326	238	227
Total Population									
Male	4,147,124	2,974,231	7,121,355	2.0	3.5	2.5			
Female	791,944	1,583,663	2,375,607	0.5	2.4	1.2	-	-	-
Total	4,939,068	4,557,894	9,496,962	1.4	3.1	1.9	157	133	124

In comparison with 2004–2010, the 2010–2022 period added more other population (foreigners), however, there were differences in the intercensal duration. No doubt, this period of massive labor reforms, deportation of illegal immigrants, emphasizing native and female employment, and reforms in immigration, was also a period of selective immigration, especially to build a highly skilled immigrant labor force. All these efforts and Vision 2030 projects including future city programs created

varied demands for the foreign labor force and their dependent families. Hence, the foreign population growth continued to fulfill the massive development activities involving constructions requiring supplies and services.

Although the differences in intercensal intervals were reflective of the higher population increase in 2010–2022 than in 2004–2010, annual growth rates explain this phenomenon differently. There was a sharp decline in population growth, both natives and others, and thus the total. Immigrant population growth declined from 5.3 to 3.8 whereas that of natives reached zero growth from 2.1 to 0.0. However, the combined growth rate of 2004–2022 period showed s a higher growth of foreigners (4.3%), as against natives (0.7%). This paradox explains the demographic dynamics—a joint effect of fertility, mortality, and migration. These data show, probably, an overall stabilization of the native population through reproductive efficiency, demographic dividend, and revamped social structures, as pointed out by Salam and Mini (2024), Lee and Reher (2011), and Al-Khraif et al. (2022a).

With the increasing demographic dividend of the native population, there were increases in the modern sector employment per family. And thus, there were improvements in quality of life, urbanization, modern living arrangements, and lifestyles. Consequently, there were upgrades in educational levels, professional skills, and outlook. Thus, a population niche (category) was created with demands for better-equipped living arrangements, domestic support, and services. Hence, demands for a different mix of foreign population as assistants, skilled laborers, and domestic aides have increased. Thus, the current replacements, reforms, deportations, future city-oriented developments, and restructuring were explained, contextually.

As debated, Saudi Arabia had an unbalanced sex ratio due to the higher proportion of the adult male foreign population (Salam 2023). While the native sex ratio was near 100, that of foreigners was 326—the highest of all the periods. Unlike, the previous findings based on demographic surveys and estimations by the General Authority for Statistics, Saudi Arabia, the foreigner sex ratio did not decrease towards a social balance. This created an overall sex ratio of 157 showing an increasing trend during the entire period. It was caused by sex-selective immigration to facilitate productivity and labor flexibility incorporated into the employment-oriented immigration strategy typical of the Arabian Gulf. This, in other words, explained the masculinity proportion in the population, which was 50.2, 76.5, and 61.2 for natives, others, and total, respectively. Similar figures were 51.0, 70.4, and 57.0 for 2010 and 50.1, 69.4, and 55.4 for 2004, respectively. These figures show an increasing masculinity in the country, as against the expectations of achieving a balanced male-female scenario. Increasing masculinity in the total population was attributed to age-sex specific immigration whereas that of natives was explained as the natural processes such as small excess of male births, as elsewhere, rather than sex-selective abortions and discrimination giving rise to issues of 'missing females', as the 'female life expectancy' keeps increasing (Hesketh and Xing, 2006; Salam 2022, 2023).

This population had an age-sex distribution, as of 2022, more or less constricted, in the case of natives. However, it lost the well-constricted shape of 2010, critically indicating consistency issues of census operations. As per the trends demonstrated continuously—1992, 2004, and 2010, it would have constricted with a clear population aging scenario (**Figure 1**). Unexpectedly, the pattern did not change, which

could be attributed to the inconsistency in census operations, definitions, and standard procedures, rather than the rapid demographic transition process. Expansion in childhood ages, reductions in adulthood ages, and a widening of old ages were the salient differences of the 2022 age structure from that of 2010. Similarly, the 2022 total population structure change was also confusingly different. A structure gained in 2010 disappeared with a very wide 25–29, 30–34, and 35–39-year age groups, which would have been an instance of age-heaping.

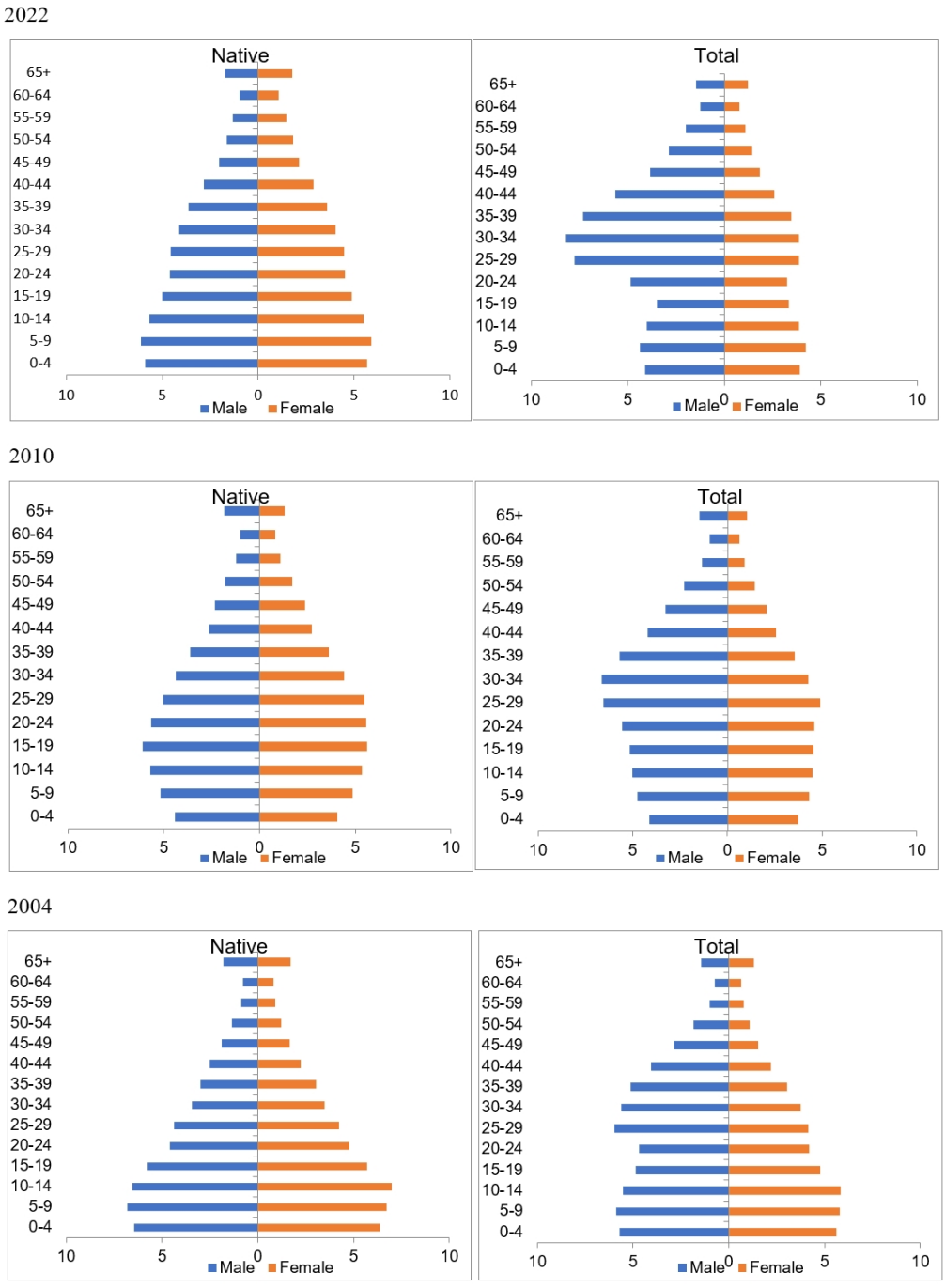

Figure 1. Population age structure, native and total, for 2022, 2010, 2004 censuses.

While age distribution was illustrated picturesquely as age pyramids, it was

usually interpreted as demographic proportions and ratios. An attempt at proportional distributions into five categories namely children (0–14 years), adolescents/youth (15–24 years), young adults (25–49 years), older adults (50–64 years), and old aged (65+ years) was attempted for the last three censuses (two decades). In addition, four indices were calculated including the aged-child ratio, child-woman ratio, age-dependency ratio, and median age bifurcated into males and females separately for natives, others, and total (**Table 2**).

Overall, the proportion of children seems critically low at 24.5 (2022), mainly due to their low share in the 'others' category, especially among males (6.8%). Females in the same category had a relatively higher proportion (21.0%). This made a huge male-female difference in the population (20.4% as against 31.0%). This was typical of the population in rapid transition, especially in progress. Boys (male children) of foreigners were less accommodated in the country than girls (female children). This special care and concern to the girl children are cultural and traditional. This scenario was different earlier, as boys and girls were of a higher proportion, in 2010 (15.2%, 29.2%, and thus 19.4%) and 2004 (14.2%, 30.9%, and, thus, 19.3%).

Table 2. Age composition and indices.

	Broad age distribution (years)					**Aging indices**			
	0–14	**15–24**	**25–49**	**50–64**	**65+**	**Aged-child ratio**	**Child-woman ratio**	**Age dependency ratio**	**Median age**
2022									
Male									
Native	35.2	19.2	34.2	7.9	3.4	14.4	-	5.6	22.6
Others	6.8	8.5	71.4	11.8	1.4	31.1	-	1.5	35.1
Total	20.4	13.6	53.6	10.0	2.4	17.2	-	3.1	31.2
Female									
Native	34.3	18.9	34.4	8.8	3.6	15.4	-	5.8	23.3
Others	21.0	11.6	57.8	7.8	1.8	12.8	-	2.4	45.7
Total	31.0	17.0	40.3	8.5	3.1	15.0	-	4.8	26.0
Total									
Native	34.8	19.0	34.3	8.4	3.5	14.9	88.8	5.7	22.9
Others	10.1	9.2	68.2	10.9	1.5	22.2	41.7	1.7	34.4
Total	24.5	15.0	48.4	9.4	2.7	16.1	74.5	3.7	29.5
2010									
Male									
Native	30.0	23.1	35.4	7.9	3.6	19.4	-	5.5	23.6
Others	15.2	11.8	63.8	8.4	0.9	8.6	-	1.1	32.7
Total	24.3	18.8	46.3	8.1	2.6	16.7	-	3.5	28.0
Female									
Native	29.1	22.8	38.0	7.4	2.7	14.8	-	4.0	24.1
Others	29.2	15.1	49.0	5.5	1.2	5.7	-	1.7	48.9
Total	29.1	21.2	40.3	7.0	2.4	12.7	-	3.5	24.8
Total									
Native	29.6	23.0	36.6	7.6	3.2	17.2	62.1	4.7	23.9
Others	19.4	12.8	59.4	7.5	1.0	7.3	70.0	1.2	31.4
Total	26.4	19.8	43.7	7.6	7.6	14.8	63.9	3.5	26.7

Table 2. (*Continued*).

	Broad age distribution (years)					Aging indices			
	0–14	**15–24**	**25–49**	**50–64**	**65+**	**Aged-child ratio**	**Child-woman ratio**	**Age dependency ratio**	**Median age**
2004									
Male									
Native	39.5	20.6	30.3	6.0	3.6	13.5	-	6.3	19.6
Others	14.2	10.5	67.0	7.4	0.8	8.2	-	1.0	33.2
Total	30.9	17.2	42.8	6.5	2.6	12.6	-	4.0	25.9
Female									
Native	40.3	20.9	29.4	5.9	3.4	12.9	-	6.0	19.2
Others	30.9	16.1	47.6	4.3	1.1	5.2	-	1.7	26.2
Total	38.6	20.0	32.8	5.6	3.0	11.7	-	5.1	20.4
Total									
Native	39.9	20.8	29.9	5.9	3.5	13.2	105.1	6.2	19.4
Others	19.3	12.2	61.1	6.5	0.9	6.7	70.4	1.2	31.4
Total	34.3	18.5	38.3	6.1	2.8	12.2	97.3	4.4	23.4

A possible reason for such a decline in the foreign child population could be the increased living cost, forcing foreigners to leave their children elsewhere, outside the country. This issue had many implications or impacts leading to building images, relationships, and socio-cultural assimilation. Opinion of Hamanaka (2017) that the share of children above 30.0 percent and adolescent/youth above 20.0 percent was critical in a society: Saudi Arabia has laudably crossed this proportion, since 2010.

The Adolescent/youth forms an important period of transition in human development marking changes in physiological, sexual, and occupational characteristics. Similar to the proportion of children, this category also faced shortcoming with a lesser proportion in the total population (15.0%) due to foreign males (8.5%) and females (11.6%). Although lower, there was a 19.0 percent of this category within the native population, as per the 2022 census. As explained by demographic transition theories (Kirk, 1996; Lee and Reher, 2011), the proportion of adolescents/youth declined, compared to the 2010 census (19.8%–18.8% in males and 21.2% in females). However, the 2004 census figures showed a lesser percentage in this category (18.5%–17.2% in males and 20.0% in females). Still, the male-female difference was lesser in 2022 at 3.1 points, compared to 3.3 in 2010 or 5.6 in 2004. Both the child and adolescent/youth population proportions, show values of children and family upbringing in society.

Adult age, the demographic dividend, expanded continuously reflecting transitions in demography, epidemiology, and health towards a quality lifestyle—environmental and hygienic. In this population, foreigners especially males had a high edge. Overall population had 48.4 percent of young adults (natives had 34.3 percent whereas foreigners had 68.2 percent). More than demographics, the foreign population in the country was employment contract holders with established skills and qualifications, thus such a higher share in this category. Females had a lesser proportion in this age group (40.3%) than males (53.6%), caused due to their ‘others’ category (71.4% of males and 57.8% of females). In comparison to the previous censuses, foreign females registered slight increases in 2022, with similar trends.

Yet another age group of adults—working ages, calculated separately—50–64 years (late adulthood) possesses a different level of functioning—socio-cultural and occupational. As of 2022, their share was only 9.4 percent (10.0% among males and 8.5% among females). Out of them, natives had a low share, as compared to others, where a male population trend was carried over. Females of this category had almost equal share in natives and others, with a marginal difference. This age of progressed years of occupational life in the country for both natives and others attached higher responsibilities at workplaces and families, and thus in the society. This key age group was considered the core, holding senior positions, responsible parenthood, and as the transmitters of social values and morals. Moreover, it demands retirement planning and readiness. In comparison with previous censuses, there was an increase in this category, as per the 2022 census. This demographic process embarks movements from the adult boom to the retirement boom.

Aging, a phenomenon of the millennium, had not been at a salient stage in Saudi Arabia, even according to the 2022 census. This might be, probably, due to the higher proportion of working ages as demographic dividend was the current scenario, which will move to the old age in the future. As stated by Salam and Mini (2024) and Al-Khraif et al., (2022a) aging will replace the demographic dividend, by 2050. Thus, the current low proportion of old age will accelerate faster in the 2030s and 2040s (Salam and Mini, 2024; Salam, 2023). The share of old age was lesser in the total population. In the native population, it remained stable at 3.5 percent for the two decades for both males and females. Old age, here, was considered as 65 years and above in this analysis. Although the retirement age stands at 60 and 62 years, people continue working on contracts, temporary assignments, private agencies, or independently up to 65 years or beyond.

Aging indices were ratios of two groups of the population. Four of them were calculated to assess demographic change over the period. The first one, the old aged to children (aged-child ratio/index of aging) shows the number of old aged persons (65+ years) per 100 children (below 10 years of age), which was 16.1 in total but 17.2 in males and 15.0 in females, as of 2022. As the foreigner ratios were predictably lower, they were not of much discussion as their childhood and old age share were not representative. Rather, that of natives stands at 14.9 in total, slightly higher in females (15.4) than males (14.4). This was consistent with female advantages and gains in aging and life expectancy on one hand and the feminine nature of aging adding to their double burden in old age, on the other. An increasing trend noted from 2004 to 2010 broke in 2022, which added anxiety and concerns.

Unlike the other ratios, the child-woman ratio was sex-specific considering the total number of children and women of reproductive ages, thus only totals were meaningful, rather than males and females. It showed the number of children (below 5 years of age) to 1,000 women of reproductive age (15–49 years). Here too the declining trend broke in 2022. It was here, that the importance of marriages and family played a role in families, not only in upbringing generations but also in the cherished filial responsibility towards the elderly and dependents (Al-Hakami and McLaughlin, 2016; Salam 2023). This ratio, thus, has significance not only in homemaking involving child care, but in the care of the aged and infirm by following traditions, customs, and values.

The age dependency ratio explains the number of old aged (65+ years) to 100 persons in working age (15–64 years). As seen in other ratios, the foreigners had a low ratio whereas natives had a higher ratio. Still, the declining trend noted in the last two censuses (4.4 in 2004 to 3.5 in 2010) broke in this census (3.7 in 2022), to an extent. This ratio remained higher in females (4.8) than in males (3.1), especially due to the male-female and native-others differences. This trend was revealed by previous censuses attributing to employment-oriented immigration, returns, and repatriations.

Median age, as an indication of the average age of the population, stands at 29.5 years (31.2 for males and 26.0 for females), revealing an increasing trend. As compared to natives, foreigners had a higher median age (34.4 against 22.9), probably, due to the absence or lesser share of children and adolescents/youth, than natives. The male-female differences were higher in others (35.1 against 45.7) as compared to natives (22.6 against 23.3), in 2022. This trend started in 2010 showed family dynamics in connection with the employment status of foreigners. However, the higher median age of females was confusing, due to their lesser number and roles as home help, domestic support, and carers. Still, the increasing trend of median age of the native population of 2004 and 2010 broke in 2022.

3.2. Regional population change

An analysis of the available data was carried out to illustrate the regional distribution of the population in total and by broad age groups. The recent census was compared with the other two censuses for trends and patterns geographically for 13 administrative areas. These geographic divisions were highly developed ones with metropolises (Al-Riyadh, Makkah Al-Mokarramah, Al-Madina Al-Monawarah, and the Eastern Region); moderately developed ones with upcoming cities (Aseer, Al-Qaseem, and Jazan); and others (Tabouk, Hail, Northern Borders, Najran, Al-Baha, and Al-Jouf). The first category had well-developed urban infrastructure with ports, economic zones, high-rise buildings (vertical development), road and rail networks, and cities of different size with widespread education, health, and other service infrastructure. The second category had medium-sized cities, vast geographic areas, partially equipped urban infrastructure, domestic airports, essential basic infrastructure, for education, health, and other services, developing road and rail networks, and upcoming promising future cities. The third category had mostly the primary sector of the economy with agriculture and livestock, slowly developing infrastructure of all kinds including road, rail, and air, and education, health, and services. They had few promising future cities, the faster-improving administrative headquarters.

A close look at the data shows that a large majority of the population lived in the first category (prominent areas) with above 70.0 percent, in all three censuses (**Figure 2**). However, there was an increase in the proportion with time indicating an increasing preference for modernized urban living conditions and livelihoods. This could be borne out of the improved educational backgrounds and professional skills enabling a better quality of life. As compared to natives, others had a higher proportion in this group of administrative areas, which could be attributed to the intensive labor demands and requirements. Although slight differences were observed, there were no visible

trends.

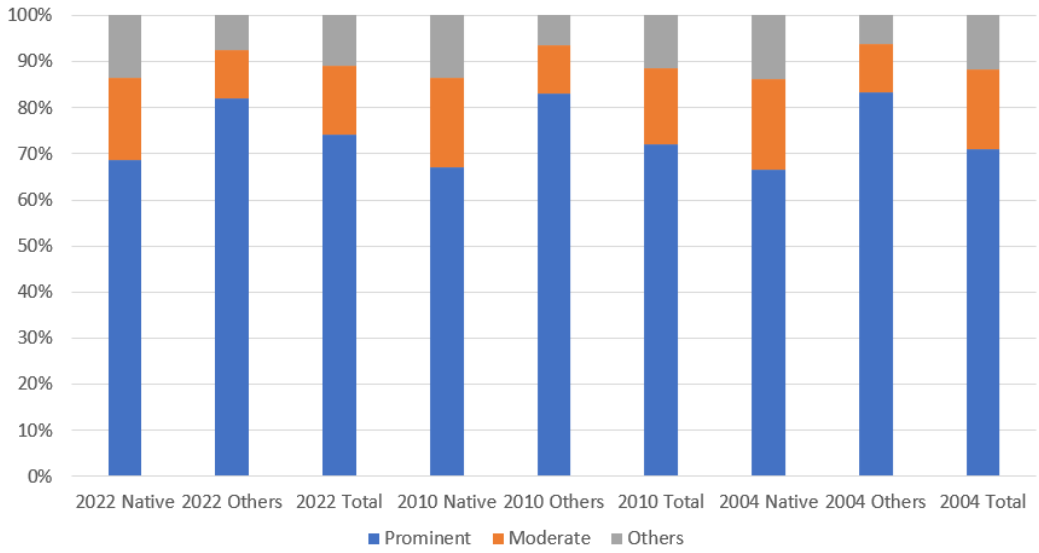

Figure 2. Geographic distribution of population, three censuses by nativity.

Detailed analyses were made to clarify this situation: Al-Riyadh had a major share of the population, as per the 2022 census, which was found to be a trend for both natives and others. While the native increased slowly, others increased faster indicating labor force requirements depending upon developments in infrastructure, and commercial and service utilities. It could be observed for a fast-paced urban development in Al-Riyadh as an effort to compete with world-class living conditions. So, the overall share of 23.6 percent of the native population (31.0% of others and 26.7% of the total) in this administrative area had almost similar percentage shares of all broad age groups in 2022. In comparison with previous censuses, the share in the area increased recently. All different age groups had an equal share in this administrative area, except for the increasing share of older persons, especially foreigners (**Table 3**). This issue was serious as with retirement, foreigners return to their home countries but, probably, accommodating older persons (parents) as dependents as a value culturally cherished to promote filial responsibility. Makkah Al-Mokarramah had the second largest population share (22.1% of natives, 28.9% of others, and 24.9% of the total). This share had not increased over the censuses, except for minor fluctuations. While the native share remained almost equal, others' share decreased, over the period. Age distribution remained intact over the period but the higher share of foreigners was in older ages. In the Eastern Region, there was an increasing trend of population of all age groups except the adolescent/youth category (15–24 years) and older persons—both native and others. Al-Madina Al-Monawarah being a holy city had a relatively lesser population share, remaining the same over the period, except that of the old aged.

Table 3. Regional distribution of population (share of population by administrative area for natives, others, and total) for 2022 in comparison with 2010 and 2004 censuses.

	2022			2010			2004		
	Native	**Others**	**Total**	**Native**	**Others**	**Total**	**Native**	**Others**	**Total**
Prominent areas									
1. Al-Riyadh									
< 15	22.6	31.4	24.1	23.7	28.5	24.8	22.4	25.9	23.0
15–24	23.6	31.0	25.5	22.7	28.5	23.9	22.5	24.3	22.9
25–64	24.7	31.1	28.3	22.8	30.0	25.7	23.1	29.7	25.9
65+	21.1	25.8	22.2	19.8	16.2	19.3	17.7	14.3	17.4
Total	23.6	31.0	26.7	22.9	29.4	24.9	22.5	28.2	24.1
2. Makkah Al-Mokarramah									
< 15	20.8	35.0	23.2	20.2	40.7	24.8	20.4	45.9	24.2
15–24	21.9	32.7	24.7	21.5	37.9	24.8	21.2	43.3	25.2
25–64	23.0	27.4	25.5	23.3	29.7	25.9	23.3	31.5	26.7
65+	25.2	43.0	29.4	24.7	51.4	27.9	23.6	56.0	26.5
Total	22.1	28.9	24.9	22.0	33.1	25.4	21.7	36.0	25.6
3. Al-Madina Al-Monawarah									
< 15	7.5	6.0	7.2	7.1	6.1	6.9	7.4	6.6	7.3
15–24	7.3	6.1	7.0	6.7	6.2	6.6	6.5	6.5	6.5
25–64	6.9	5.8	6.3	6.5	6.0	6.3	6.6	5.7	6.2
65+	7.5	6.4	7.2	6.9	14.4	7.8	7.3	11.5	7.7
Total	7.2	5.9	6.6	6.7	6.1	6.5	6.9	6.0	6.7
4. Eastern Region									
< 15	15.8	13.3	15.4	15.5	11.5	14.6	15.2	9.1	14.3
15–24	14.8	12.9	14.3	15.7	11.5	14.9	15.9	9.7	14.8
25–64	16.2	17.1	16.7	15.6	16.1	15.8	15.9	14.9	15.5
65+	13.0	10.7	12.5	11.6	6.3	11.0	11.3	5.6	10.8
Total	15.7	16.3	15.9	15.5	14.5	15.2	15.5	13.1	14.8
Total—Prominent areas									
< 15	66.7	85.8	70.0	66.5	86.8	71.1	65.4	87.4	68.7
15–24	67.7	82.7	71.5	66.7	84.2	70.2	66.2	83.8	69.4
25–64	70.8	81.4	76.8	68.1	81.7	73.6	68.9	81.8	74.2
65+	66.7	86.0	71.2	63.0	88.4	66.1	59.8	87.5	62.3
Total	68.6	82.1	74.2	67.1	83.1	72.1	66.6	83.2	71.1
Moderate areas									
1. Aseer									
< 15	7.9	2.3	7.0	8.6	2.9	7.3	8.8	2.5	7.9
15–24	8.0	3.7	6.9	8.6	3.4	7.5	8.7	3.4	7.8
25–64	7.2	4.7	5.8	8.2	4.3	6.6	8.1	4.8	6.7
65+	9.5	2.9	7.9	11.3	1.6	10.2	12.3	1.5	11.3
Total	7.7	4.3	6.3	8.5	3.8	7.1	8.7	4.1	7.4
2. Al-Qaseem									
< 15	4.9	2.0	4.4	5.0	2.1	4.4	5.1	1.8	4.6
15–24	5.2	3.1	4.7	5.2	2.8	4.7	5.1	2.4	4.6
25–64	4.8	3.2	3.9	4.8	3.9	4.4	4.7	3.8	4.3
65+	5.0	1.6	4.2	5.0	0.9	4.5	5.2	0.9	4.8
Total	4.9	3.1	4.2	5.0	3.4	4.5	4.9	3.2	4.5

Table 3. (*Continued*).

	2022			2010			2004		
	Native	**Others**	**Total**	**Native**	**Others**	**Total**	**Native**	**Others**	**Total**
3. Jazan									
< 15	5.3	4.5	5.2	5.7	3.7	5.2	6.2	4.1	5.8
15-24	5.6	3.7	5.1	6.0	4.2	5.7	6.2	5.2	6.1
25-64	5.1	2.7	3.8	5.9	2.7	4.6	5.5	2.4	4.3
65+	6.5	4.1	5.9	7.1	5.6	6.9	7.7	7.0	7.7
Total	5.3	3.0	4.4	5.9	3.1	5.0	6.0	3.1	5.2
Total—Moderate areas									
< 15	18.2	8.9	16.6	19.3	8.8	16.9	20.1	8.4	18.3
15–24	18.8	10.5	16.7	19.8	10.3	17.9	20.1	11.0	18.4
25–64	17.2	10.6	13.4	18.9	10.9	15.7	18.4	11.0	15.3
65+	21.0	8.6	18.1	23.5	8.2	21.7	25.2	9.5	23.8
Total	18.0	10.4	14.8	19.4	10.4	16.6	19.6	10.5	17.2
Other areas									
1. Tabouk									
< 15	3.7	1.0	3.2	3.8	1.2	3.2	4.0	1.1	3.6
15-24	3.5	1.6	3.0	3.4	1.3	3.0	3.4	1.2	3.0
25-64	3.2	2.0	2.5	3.5	1.7	2.8	3.4	1.8	2.7
65+	2.5	1.4	2.3	2.6	0.8	2.4	2.5	0.7	2.4
Total	3.4	1.9	2.8	3.5	1.5	2.9	3.6	1.6	3.1
2. Hail									
< 15	3.0	0.8	2.6	2.6	0.8	2.2	2.7	0.6	2.4
15–24	2.8	1.3	2.4	2.7	1.0	2.4	2.8	0.9	2.5
25–64	2.6	1.8	2.2	2.6	1.5	2.1	2.6	1.5	2.1
65+	3.0	1.2	2.6	3.1	0.4	2.8	3.9	0.3	3.6
Total	2.8	1.6	2.3	2.6	1.3	2.2	2.7	1.2	2.3
3. Northern Borders									
< 15	1.7	0.7	1.5	1.5	0.4	1.3	1.6	0.5	1.4
15–24	1.4	0.7	1.3	1.5	0.5	1.3	1.5	0.6	1.3
25–64	1.3	0.8	1.0	1.4	0.7	1.1	1.3	0.7	1.1
65+	1.2	0.5	1.0	1.3	0.3	1.1	1.2	0.3	1.1
Total	1.4	0.8	1.2	1.4	0.6	1.2	1.5	0.7	1.2
4. Najran									
< 15	2.5	1.8	2.4	2.4	1.1	2.1	2.3	1.1	2.1
15–24	2.1	1.7	2.0	2.1	1.4	2.0	2.1	1.3	2.0
25–64	1.8	1.4	1.6	2.0	1.2	1.7	1.9	1.1	1.6
65+	1.9	1.3	1.7	2.1	1.0	2.0	2.1	1.2	2.0
Total	2.1	1.5	1.8	2.1	1.2	1.9	2.1	1.2	1.9
5. Al-Baha									
< 15	1.3	0.4	1.2	1.6	0.4	1.4	1.9	0.4	1.7
15–24	1.4	0.5	1.1	1.9	0.6	1.6	2.0	0.5	1.7
25–64	1.3	0.7	0.9	1.9	0.9	1.5	1.9	1.0	1.5
65+	2.1	0.4	1.7	2.9	0.3	2.6	3.6	0.2	3.3
Total	1.3	0.7	1.1	1.9	0.8	1.5	2.0	0.8	1.7

Table 3. (*Continued*).

	2022			2010			2004		
	Native	**Others**	**Total**	**Native**	**Others**	**Total**	**Native**	**Others**	**Total**
6. Al-Jouf									
< 15	3.0	0.7	2.6	2.2	0.6	1.8	2.0	0.5	1.8
15–24	2.3	0.9	2.0	1.9	0.8	1.7	1.9	0.7	1.7
25–64	1.9	1.3	1.5	1.6	1.2	1.5	1.7	1.0	1.4
65+	1.7	0.7	1.4	1.5	0.7	1.4	1.6	0.2	1.5
Total	2.3	1.2	1.9	1.9	1.1	1.6	1.9	0.9	1.6
Total—Other areas									
< 15	15.1	5.4	13.5	14.2	4.5	12.0	14.5	4.2	13.0
15–24	13.5	6.8	11.8	13.5	5.5	11.9	13.7	5.2	12.2
25–64	12.1	8.0	9.7	13.0	7.3	10.7	12.7	7.1	10.4
65+	12.4	5.4	10.7	13.5	3.5	12.3	14.9	3.1	13.9
Total	13.4	7.5	11.0	13.5	6.5	11.3	13.7	6.3	11.7

This category of administrative area had a native share of 68.6 percent (82.1% of others and 74.2% of the total). Although these percentage shares have been intact since 2004, these four administrative areas covered more than two-thirds of the population. All major age groups had such a higher share. Moreover, the others were highly concentrated with more than 80 percent. These administrative areas had well-knit infrastructure including housing stock developed sector-wise as self-contained townships at par with expected amenities and ease of travel, to and from city centers, and industrial/administrative/commercial establishments. There were educational institutions, medical facilities, and other utilities at every corner close to the residential pockets. Hence, these areas had built-in infrastructure competitive with international standards offering livability and environmental sustainability, as Al-Khraif et al., (2022b) explained in the city ranking exercise.

The second category of administrative area underwent rapid transformations as growth centers, urban clusters, and development zones under the future city programs, with well-set development corridors, and newer hubs of education, entertainment, and socio-cultural activities. These developments might have attracted more and more people and thus facilitated redistribution, but the data does not support this expectation. For example, Aseer with medium-sized cities like Abha, Khamis Mushayt, and Mahayel experienced a decreasing share of the total population, especially natives and thus the total. Both Al-Qaseem and Jazan followed a trend similar to Aseer. This stationary trend taught lessons, especially in line with population distribution, livelihood options, and infrastructure building.

The third group of administrative areas showed a no-change scenario in Tabouk and Hail; a decreasing native population in Al-Baha—all age groups; an increasing other in Najran—all age groups; an increasing native population in Al-Jouf—all age groups; and an increasing trend of children and adolescent/youth in Northern Borders. Such demographics had relevance to social dynamics, thus demanding age-specific projects and programs of education, employment, and entrepreneurship to maintain values to limit outmigration and to ensure quality living (Al-Khraif et al., 2022a; Hamanaka, 2017; Salam and Mini, 2024). Overall, the population share in this

category of administrative areas remained intact in all three censuses with more than ten percent natives. These small administrative areas serve various special purposes of the country and thus population share cannot be an issue. Military camps of Tabouk; hill stations of Al-Jouf; agricultural sectors of Al-Baha and Hail; and forests of Northern Borders have had their importance. Still, with certain differences in living arrangements, these geographic segments could be integrated into the massively changing Saudi Arabia for better dwellings and thus in image building. With this, not only the population redistribution, over-crowding at urban centers, and environmental degradation could be addressed. With geographic conditions considered, living in these administrative areas could be promoted as heritage villages, environmental sustainability ecosystems, agricultural cooperative housing societies, earth-sheltered housings, and residential hubs. Such endeavors would reduce the pressures of large cities and administrative headquarters.

The recent census does not show the population redistributed along the efforts in line, which might have arisen from various factors including the concentration of development activities in the primate city and a few others. Along with the ongoing future city programs, concepts of self-contained townships accommodating around 200-500 families with basic educational, health, and other service utilities to be initiated with a redistribution policy, equitable geographic development, and spreading infrastructure across the country will be of significance in reducing concentration and density, thereby, improving quality of living along with standards of systems and structures competitive with the global trends.

Researches using census data for demographic trends, patterns, and distribution are essential and thus to be promoted through analyses making data available for projects, theses, and dissertations. With the detailed raw data, many analyses could be made to lighten policy measures and improve the knowledge base for the management of social and health sectors.

Lacunae in census results are vividly attributed to changes in definitions, operations, reports, and intercensal duration. This makes comparisons, analyses across censuses, and population projections and policies arduous and misleading. This sentimental issue requires meticulous efforts to maintain the census with a clear pattern and with well-defined concepts, reference periods, and standardized reports of tables of comparable contents across years. This laudable process paves the way for comparisons, technical research reports, monographs, and special issues on various topics. These limitations affected this empirical analytical research.

4. Conclusions

Two decades have added a large population in the country, both natives and others (foreigners), although there has been a stalled growth of the native population. However, the foreign population continues growing through replacements of their major share of adult males to bridge the gap in labor requirements, where the sex ratio continues to widen. Such a demographic trend gives rise to an aging situation—constriction of the age pyramid demonstrating an increasing proportion of adults—demographic dividend as a window of economic opportunity (Al-Khraif et al., 2022a; Prskawetz, 2007; Saxena, 2008). While there was a vivid shrinking of the childhood

population, old aged population had not started expanding. This era witnessed an adult boom and a retirement boom impinging on the population aging, shortly. A large share of the population lived in four major administrative areas – Al-Riyadh, Makkah Al-Mokarramah, Al-Madina Al-Monawarah, and the Eastern Region, with a lesser share in the moderate development areas and lowest in the others, a common unchanged pattern since 2004, except for few native-others differences at times.

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