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- Submission of Paper: **9 June 2025**

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Birth Intervals and Stunting in Bangladesh

*By Unnati Rani Saha[±], Laura Gomez Cely[°], Lia van Wesenbeeck[•]
& Arthur van Soest^{*}*

This paper analyses the relation between birth intervals and stunting of under-five children in Bangladesh. The main novelty of this study compared to the existing literature is that we use an econometric panel data model that accounts for the birth interval's potential endogeneity and for potentially correlated unobserved heterogeneity in the stunting and birth interval equations. The model is estimated using data on 7,849 children under five of birth order two and higher in the 2017-18 Bangladesh Demographic and Health Survey. We find that a ten percent increase in the preceding birth interval reduces the probability of stunting by 2.17 percentage points for an average observation, ceteris paribus. This effect is more than five times larger than the effect found with a standard model not accounting for endogeneity. Simulations of counterfactuals using the complete model show how household wealth, parental education, and regional differences drive birth intervals and stunting. For example, the estimated indirect regional effect on stunting through birth spacing moving from Dhaka to Sylhet is almost 5%-points. On the other hand, the direct effect (keeping birth intervals constant) is even larger: 12%-points. This leads to important conclusions for policies to bring down stunting by lengthening birth intervals.

Keywords: *Stunting, under-five, causality, birth intervals, Bangladesh*

Introduction

According to the World Health Organization (WHO), a child is stunted if its height-for-age is more than two standard deviations below the WHO Child Growth Standards median (WHO, 2014). The stunting percentage is often seen as the best single indicator of well-being for children under five years and is one of the indicators of malnutrition in the context of the sustainable development goal to end hunger, achieve food security, improve nutrition and promote sustainable agriculture (UNICEF/WHO/World Bank Group Joint Child Malnutrition Estimates, 2020). Grantham-McGregor et al. (2007) propose stunting as one of the two leading indicators of poor child development, together with absolute poverty. Stunting often occurs in children who live in low-income countries, as they are less likely to have

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access to safe drinking water, adequate sanitation and hygiene, nutritious food, and good health care. As a consequence, these children become susceptible to diseases and infections such as malaria, diarrhea, and pneumonia (Black et al., 2003), and are exposed to malnutrition and stunting. Strong associations are observed between stunting and lack of schooling and reduced economic productivity. For instance, Grantham-McGregor et al. (2007, Table 6) estimated that stunting results in an educational performance deficit of 2.91 years causing a 19.8% loss in adult income. This damage can also affect future generations, creating a persistent poverty trap (Prendergast and Humphrey, 2014).

A study in Bangladesh has confirmed there is a robust intergenerational linkage between short maternal stature and offspring stunting (Khatun et al., 2019). Globally in 2019, approximately 21.3% of all children under the age of five years are affected by stunting (UNICEF/WHO/World Bank Group Joint Child Malnutrition Estimates, 2020). According to data from the Bangladesh Demographic Health Survey (BDHS) 2019, 31% of all children under the age of five were stunted in 2017 - 2018. The level of stunting among children under five has declined from 43% in 2007 to 31% in 2017 - a reduction of 1.2 percentage points per year. The Health Population and Nutrition Sector Development Program (HPNSDP) in Bangladesh aimed to reduce the stunting levels to 25% by 2025. To achieve this goal, it is essential to analyze the risk factors for stunting to help design effective policies and public health interventions.

Determinants of stunting in Bangladesh identified in the literature include parental education, maternal nutrition, household socio-economic status, size of the baby at birth, birth order, place of residence and preceding birth interval (Faruque et al. 2008; Das et al. 2009; Jesmin et al. 2011; Heady et al., 2015; Islam et al., 2018; Saha et al., 2019; Svejars et al., 2019; Saha et al., 2020; Saha and Wesenbeeck, 2021). In the current study we focus on the role of birth spacing. A short preceding birth interval (less than two years) can place the child at risk for several reasons. First, the fact that the mother has not yet recovered from the previous birth can lead to low birth weight of the next born child. Second, the time that mothers can devote to a newborn child can be less if there is another infant (Chungkham et al., 2020). It is also possible that the household is exposed to food insecurity since more mouths must be fed.

In the existing literature, the risk factors were included as exogenous variables. Some of them, and birth spacing in particular, might however depend on unobserved mother or household characteristics that also drive the likelihood of stunting. For example, birth spacing can be affected by the same community values, customs and beliefs driving child nutrition. This implies that a risk factor like the space between two births may be endogenous so that its association with stunting does not necessarily have a causal interpretation. This is a limitation from a policy perspective, since evaluating the effectiveness of a policy or intervention to overcome malnutrition requires identifying causal effects rather than estimating associations (cf. Moffitt, 2005).

The main novelty of our analysis is that our model accounts for potential endogeneity of the birth interval in the equation for stunting. To achieve this, we will use instrumental variables related to the gender composition of the family (the gender of the previously born child, dummy variables for the lack of sons and daughters among previous children). In many developing countries including

Bangladesh, short birth intervals are a consequence of gender preferences and family planning. For Bangladesh, Rahman and Da Vanzo (1993) found that son preference is vital in determining family planning and family composition -- the likelihood and timing of a subsequent birth are related to the number of sons. On the other hand, women also want to give birth to a girl when they already have several sons. We show that in our data, these instruments are indeed correlated with birth intervals, in line with gender favoritism.

We use data on 7,849 children under five of birth order two and higher in the 2017-18 Bangladesh Demographic and Health Survey. Our model consists of a probit equation for the binary stunting outcome and a linear equation for the log birth interval, with error terms that can be correlated. An additional novelty compared to existing studies is that we incorporate unobserved mother specific heterogeneity in both of these equations. This is feasible because for many mothers, we have observations on more than one child, allowing us to use a panel data model with random unobserved heterogeneity terms. The unobserved heterogeneity terms in both equations are also allowed to be correlated.

We find that the model with endogenous birth intervals is supported by the data -- exogeneity of the birth interval is rejected and validity of the instruments is not rejected. With this model, we find that a ten percent increase in the preceding birth interval reduces the probability of stunting by 2.17 percentage points for an average observation, keeping other regressors constant. This effect is much larger than the estimated effects in models that do not account for endogenous birth intervals.

Literature Review

There are many channels through which birth intervals can affect malnutrition and stunting in infants and young children. The literature distinguishes prenatal and postnatal mechanisms.

The prenatal channel relates to the nutritional basis that a woman requires before conception. A pregnant woman needs substantially more protein, vitamins and minerals than a non-pregnant woman (Del Valle et al., 2011). If the birth interval is short, women may not have regained the initial nutritional bases of, e.g., calcium and iron, which are needed to support fetal development (Pebbley and Da Vanzo, 1993). Insufficient food intake may accelerate the mothers' nutritional health problems and thus hamper fetus development and increase the risk of stunting (King, 2003). In a recent study, Svefors et al. (2019) emphasize the need to address prenatal risk factors to reduce stunting in Bangladesh.

Previous studies on the relation between stunting and birth intervals focused on associations rather than trying to find causal relationships. Rutstein (2005) analyzed stunting on panel data from 17 developing countries. The key independent variable was the length of the preceding birth interval. The study found a significant negative association between stunting and the preceding birth interval. In particular, children born after a birth interval shorter than 18 months faced a 43% higher risk of stunting than children born after an interval of 60 months or longer. Aerts et al. (2004) analyzed the risk of stunting among children under five in the city of Porto Alegre, Brazil, and found an odds ratio of 1.69 for birth intervals shorter than 24 months.

Fink et al. (2014) estimated the effect of birth spacing on stunting using a pooled cross-section of Demographic Health Surveys conducted between 1990 and 2011 in 61 countries, including Bangladesh. They found relative risks of short birth intervals that are significantly different from 1 but much smaller than the ones in Aerts et al. (2004): 1.09 and 1.06 for birth intervals less than 12 months and between 12 and 23 months, respectively, compared to a 24–35 months inter-pregnancy interval. Miller and Karra (2020) used longitudinal data on children born between 2002 and 2013 in Ethiopia, India, Peru, and Vietnam. They found a strong and significant positive association between birth spacing and child height for young children, but the difference falls as children age. If the relation can be interpreted as a causal effect of birth intervals on stunting, this suggests that children born after a short interval catch up when they get older.

The post-natal channel mainly relates to cultural aspects and gender preferences driving fertility. Gender preference may lead to more births and children who get less parental attention and compete for scarce family resources such as food (Sulloway, 1996). As a result, higher order births more often suffer from various health hazards including stunting (see, e.g., Shapiro-Mendoza et al., 2005, and Jayachandran and Pande, 2017). For Bangladesh, Rahman (2016) found that children of birth order three, four, or five and higher are 24%, 30%, and 72% more likely to be stunted than first-born children, controlling for mother's weight and height and socio-economic and demographic characteristics of the household. Akram et al. (2018) found a larger prevalence of stunting among children born after an interval of less than 48 months than among children born after a longer birth interval, in both urban and rural areas. They did not control for the birth interval in their multiple regressions of stunting, however. Studies that consider the role of birth spacing for stunting specific for Bangladesh are scarce. Because of this, the overview article of Islam et al. (2020) does not even consider the risk factor birth interval.

Again, the existing studies find associations that are sometimes interpreted as causal, but do not aim at isolating causal effects from confounding factors that may explain the associations since they affect both birth intervals and stunting. In the current study, we address this gap by developing a two-equations model in which the birth interval can be endogenous to the stunting outcome. Moreover, another novelty compared to the existing literature is that we exploit the fact that for some mothers we have two or more children in the data set, allowing us to use random mother specific effects in both equations, possibly correlated and thus creating another source of endogeneity.

Data

This study uses data from the Bangladesh Demographic Health Survey (BDHS) 2017,¹ a nationally representative survey that collects information on a wide range of sociodemographic variables and health indicators. The dataset has height-for-age z-scores (HAZ) for 7,902 children under the age of five, as well as many other

¹Children recode file: BDKR7FI.DTA

variables at various levels: child, parents, household, and community. Among the 7,902 children, 53 cases were dropped due to inconsistent values (flagged cases). The final sample for our analysis includes 7,849 children of ages 0 to 59 months. They have 6989 different mothers, ranging in age from 15 to 49 years. The data also allows identifying the gender of the older siblings,² as well as the total number of girls and boys each mother gave birth to and who survived till the day of survey interview date.

The overall stunting rate in this sample is 31.4%. This is higher than the 28% average for all developing countries reported by Grantham-McGregor et al. (2007, Table 4) but smaller than their figure of 39% for South Asia. Table 1 shows that stunting is more common among higher birth orders. It is substantially (and significantly) lower among first born children (28.6%) than among children of higher birth order (33.1%), in line with the findings in the literature.

Table 1. Stunting Rates (in %) by Birth Order

Birth order	Number of observations	Percentage stunting
1	2997	28.6
2	2556	29.4
3	1320	33.4
4	565	38.8
5	246	45.5
6	95	49.5
7	40	50.0
8 or more	30	46.7
All	7,849	31.4

Table 2 shows some descriptive statistics of the explanatory variables that we will use in our analysis. Considering the literature (cf. Section 2), variables that are related to the probability of stunting include the gender of the child, religious affiliation, birth order, and the mother's and father's education levels. More than 91% of the sample are Muslims. Mothers tend to be higher educated than fathers: Among husbands, 14.6% are non-educated, 33.8% and 49.7% have primary and secondary and above education, respectively, while among mothers, only 7.1% are non-educated, 29% have primary education, and 63.8 have at least some secondary education. The national survey data in Bangladesh suggests that women's education levels continue to increase over the years (NIPORT and ICF, 2019).

Another important socio-economic variable is the wealth index quintile, a composite measure of a household's cumulative living standard.³ Most variables have 7,849 observations. Exceptions are the variables *Birth interval*: the preceding birth intervals in months, and *Distnhc*: distance to the nearest health clinic in which 25 observations were found missing. The preceding birth interval in months has only 4,830 observations because it is not defined for firstborn children (2,997 observations).

²The file 'Individual Recode: BDIR7FL.DTA'

³According to the DHS documentation, the wealth index is calculated using principal components analysis from data on household ownership of selected assets, such as televisions and bicycles, and materials used for housing construction; and types of water access and sanitation facilities. See [Standard Recode Manual for DHS7 \[DHSG4\] \(dhsprogram.com\)](#), p.25.

Moreover, there are 22 observations of birth order two where the birth interval is missing.

We include variables indicating that the mother is short or has low weight, as well as the mother's age at birth of the child. In addition, we include the community level variable distance to the nearest health center (in km) and a dummy for living in a rural area. Almost 66% of the households in the sample live in a rural area. We also include dummies for the divisions of Bangladesh. Like stunting rates, differences in birth intervals across administrative divisions are large, with the medians varying from 39 months in Sylhet to 68 months in Khulna (cf. Saha et al., 2019).

Table 2. *Descriptive Statistics*

VARIABLES	Mean	St. dev.	Min	Max
Age of child (mos.)				
Agech1 (0-5)	0.119	0.324	0	1
Agech2 (6-11)	0.099	0.299	0	1
Agech3 (12-23)	0.205	0.404	0	1
Agech4 (24-35)	0.193	0.395	0	1
Agech5 (36-47)	0.186	0.389	0	1
Agech6 (48-59)	0.198	0.399	0	1
Wealth_index	3.000	1.414	1	5
Birth order	2.124	1.264	1	11
Birth interval (months)	60.90	34.17	8	256
Barisal	0.105	0.307	0	1
Chittagong	0.161	0.368	0	1
Dhaka	0.142	0.349	0	1
Khulna	0.106	0.308	0	1
Mymensingh	0.119	0.324	0	1
Rajshahi	0.104	0.305	0	1
Rangpur	0.115	0.319	0	1
Sylhet	0.148	0.355	0	1
Rural	0.658	0.474	0	1
Mother no education	0.071	0.258	0	1
Mother primary education	0.290	0.454	0	1
Mother secondary+ education	0.638	0.480	0	1
Father no education	0.146	0.353	0	1
Father primary education	0.338	0.473	0	1
Father secondary+ education	0.497	0.500	0	1
Muslim	0.914	0.280	0	1
Child is male	0.521	0.500	0	1
Mother age at birth	23.776	5.497	13.00	48.42
Mother_lowbmi ⁴	0.160	0.367	0	1
Mother_small ⁵	0.133	0.339	0	1
Distnhc	5.400	4.432	0	31.06
Noboy	0.306	0.461	0	1
Nogirl	0.321	0.466	0	1
Previous child is male	0.301	0.458	0	1

⁴Body mass index ≤ 18.5 kg/m².

⁵Height ≤ 145 cm.

Figure 1 presents the distribution of preceding birth intervals. The median preceding birth interval is 54 months. It is 56 in families with at least one living son and one daughter, 530 if there is a son but no daughter, and 51 if there is one daughter but no son. The differences suggest that, in particular, not having a son speeds up the next birth, in line with a preference for having sons. This suggests that we can use the gender composition variables as instruments: they have a direct effect on the birth interval, but it seems plausible that they do not have a direct effect on stunting.

Figure 1. *Histogram of preceding Birth Intervals*

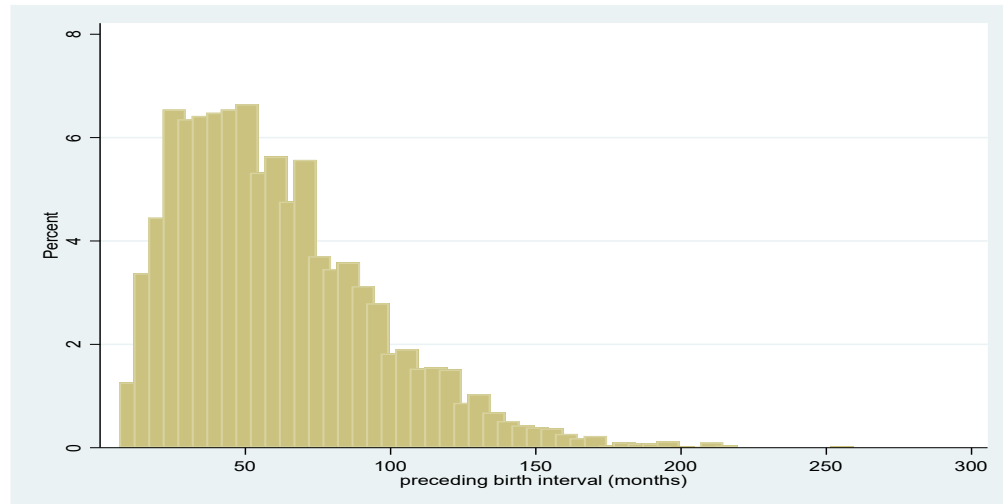
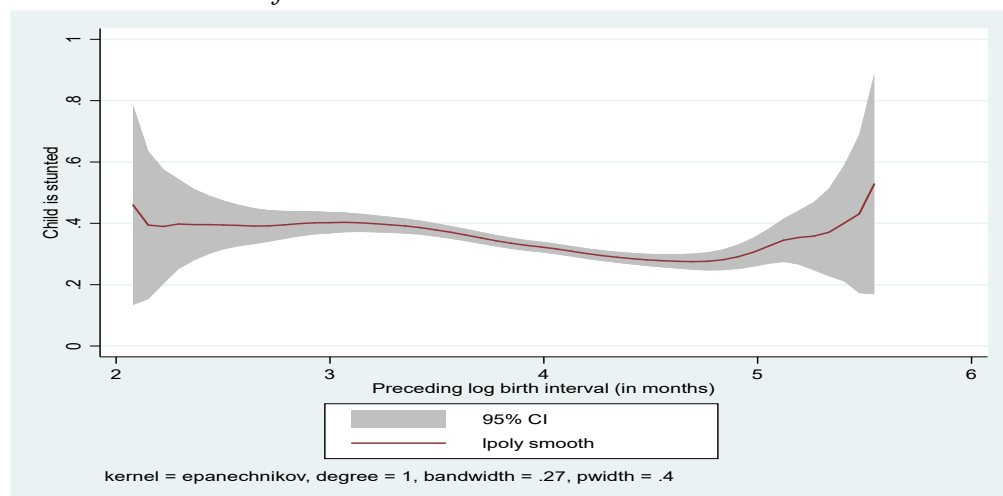


Figure 2 presents a nonparametric regression of stunting on the log of the preceding birth interval, with 95% confidence bands. (First born children are excluded.) It clearly illustrates the negative association between the two: a longer birth interval is associated with a smaller probability of stunting. The main goal of our study is to establish whether this can be given a causal interpretation or not.

Figure 2. *Non-parametric Regression of Stunting on the Log Preceding Birth Interval with 95% Confidence Intervals*



Empirical Model

To identify the causal effect of birth spacing on stunting, we account for unobserved common factors that drive birth intervals and have a direct effect on stunting (keeping other explanatory variables constant). Since some mothers have two children under five in our data set, we can distinguish between unobserved factors that are specific to the mother (“mother specific unobserved heterogeneity” in terms of panel data models; cf., e.g., Arulampalam and Bhalotra, 2008) and child specific unobserved factors that are independent across children (“error terms”).⁶ We consider the following multilevel two equations model:

$$\begin{aligned} S_{it}^* &= X_{it}\beta + \gamma \ln(B_{it}) + \alpha_{si} + u_{it}; S_{it}=1 \text{ if } S_{it}^* > 0 \text{ and } S_{it}=0 \text{ if } S_{it}^* \leq 0 & (1) \\ \ln(B_{it}) &= X_{it}\delta + Z_{it}\eta + \alpha_{bi} + v_{it} & (2) \end{aligned}$$

$$\begin{aligned} (u_{it}, v_{it}) &\sim_{iid} N_2(0, \Sigma) \text{ independent of all } X_{it} \text{ and } Z_{it}, \text{ with } \Sigma(1,1)=1 \\ (\alpha_{si}, \alpha_{bi}) &\sim_{iid} N_2(0, \Omega) \text{ independent of all } X_{it}, Z_{it} \text{ and } (u_{it}, v_{it}) \end{aligned}$$

Equation (1) is a probit equation for stunting: $S_{it}=1$ if child t of mother i is stunted, $S_{it}=0$ otherwise. The covariates X_{it} include socio-economic status indicators and other household and local community characteristics (see Table 2) other than the preceding birth interval. All variables in X_{it} are assumed to be exogenous. On the other hand, the log preceding birth interval $\ln(B_{it})$ is allowed to be endogenous. This is because it can be correlated with unobserved household characteristics that also affect birth intervals. For example, lack of knowledge of contraceptives, limited access to contraceptives, or the reluctance to use contraceptives can be correlated to nutrition habits or other behaviors affecting stunting. To some extent this problem will be mitigated by including a rich set of socioeconomic household and community characteristics, but other factors may not be captured by the covariates observed in the data.

To capture these potential correlations between unobserved factors affecting birth intervals and stunting, Equation (2) is added to the model. This is a linear equation for the log birth interval $\ln(B_{it})$. The birth interval can depend on the same covariates X_{it} but may also depend on exogenous variables Z_{it} (“instruments”) that do not have a direct effect on S_{it} . For Z_{it} we use variables determined by the family composition before the birth of index child t (presence of boys, presence of girls, gender of the previous sibling). This is in line with the work on the effect of birth intervals on infant mortality by, e.g., van Soest and Saha (2018), who show that the gender composition affects birth spacing and family planning in Bangladesh but argue that it is plausible that it has no direct effect on mortality. Since mortality and stunting are both indicators of child health, the assumption that the gender composition does not directly affect mortality has similar intuitive appeal as the assumption that gender composition does not affect stunting.

⁶Mothers (or households) are treated as a random sample (from the Bangladesh population of mothers (households) with children younger than five), so events related to different mothers are assumed to be independent.

Still, this assumption is not beyond dispute. In particular, Jayachandran and Pande (2017) argue that in India, a country with very strong son preference, limited resources might be allocated to sons rather than daughters, so that children with brothers rather than sisters are disadvantaged and more susceptible to stunting. Since this plays a lesser role for Muslims than for Hindus, it may be less relevant in our sample data where Muslims are majority. Moreover, as a sensitivity check, we will also consider models that do not use these (or other) exclusion restrictions.

The mother or family-specific effects α_{si} and α_{bi} capture the unobserved mother level factors like genetics or preferences for family size that do not vary over time. As argued above, there are good arguments why α_{si} and α_{bi} may be correlated with each other, so we allow for a nonzero covariance $\Omega(1,2)$ between the two.

The idiosyncratic errors (u_{it}, v_{it}) capture child specific shocks, such as temporary health shocks to the mother that increase the probability of stunting (u_{it}) but might also delay getting pregnant or speed up birth when a woman is pregnant (v_{it}). In the most general specification, we allow for a nonzero covariance $\Sigma(1,2)$ between u_{it} and v_{it} , though the need for this is less clear than the need to allow for a nonzero correlation between α_{si} and α_{bi} .

The log birth interval is endogenous in the stunting equation if either α_{si} and α_{bi} are correlated or if u_{it} and v_{it} are correlated, or both. If both correlations are zero, we do not need to estimate the equations jointly and can estimate a random effects probit model for stunting (allowing for correlation between unobservable factors that drive stunting of different children of the same mother). If α_{si} and α_{bi} are correlated but u_{it} and v_{it} are not, we can use the panel structure of the data to identify γ and we do not need exclusion restrictions in the stunting equation for identification. If α_{si} and α_{bi} are correlated and u_{it} and v_{it} are also correlated, the model is technically still identified due to its nonlinear nature, but exclusion restrictions are needed to get a more solid basis for identification. In the next section, we will discuss the estimates of several versions of the model. Considering loglikelihoods and several tests for model specification and selection, we will conclude that the model with exclusion restrictions and correlation between error terms as well as mother specific heterogeneity terms gets most support from the data.

The model is estimated by maximum likelihood, using the generalized structural equation model estimation (GSEM) routine in Stata. The likelihood contributions are a product of normal probabilities and densities, mixed with the density of the mother specific effects. Mixing (i.e., bivariate numerical integration) is performed using Gauss-Hermite quadrature.

Results

Table 3 presents the estimates of some standard models for stunting. The first column presents the results of a standard probit model for first born children, where there is no preceding birth interval. The second column considers a probit model for children of birth order two and higher, allowing for correlation between error terms for different children of the same mother. This model accounts for mother specific unobserved heterogeneity, but both the unobserved heterogeneity term and the

remaining error term are independent of the birth interval. The results reveal a significant negative association between log birth intervals and stunting, keeping other observed factors constant. This result is in line with the existing literature. The estimated coefficient of -0.092 implies that, on average, a 10% increase of the birth interval is associated with a reduction in stunting of about 0.33%-points, *ceteris paribus*.⁷

For many of the other covariates, the estimates for first born children are qualitatively similar to those for higher order births. For example, the likelihood of stunting falls with mother's age at birth. Stunting is substantially more likely if the mother is short herself and somewhat more likely if the mother is underweight. Community characteristics are not significant. There is a strong and significant negative wealth gradient: Compared to the poorest wealth quintile, the richest group has a 10%-points lower probability of stunting for higher order births, on average. For first order births, the estimated difference is even somewhat larger (21%-points). Keeping wealth and other variables constant, the association with the father's education level is significant for higher order births but not for the first child.

Table 3. Models for Risk Factors associated with Stunting in Under-five Children

Covariate	Subsample: first-born children (birth order =1); Standard probit model		Subsample: other than first born children (birth order >1); Probit model		Subsample: other than first-born children (birth order >1); Quasi fixed effects probit model	
	coeffic.	s.e.	coeffic.	s.e.	coeffic.	s.e.
Child level factors						
Child's age 6-11 months	-0.049	0.117	0.065	0.091	0.066	0.091
12-23 months	0.387**	0.095	0.576**	0.075	0.577**	0.075
24-36 months	0.453**	0.094	0.674**	0.076	0.672**	0.076
37-47 months	0.194*	0.098	0.628**	0.076	0.626**	0.076
48-59 months	0.009	0.099	0.375**	0.075	0.371**	0.076
Gender of child, male	-0.001	0.051	0.007	0.039	0.007	0.039
Religion of child, Muslim	0.050	0.087	-0.021	0.076	-0.022	0.0756
Birth order	-	-	0.070*	0.024	0.069**	0.024
Preceding log birth interval	-	-	-0.092*	0.041	-0.009	0.125
Mean log birth interval	-	-	-	-	-0.093	0.132
Mother level factors						
Age of mother at childbirth (continuous)	-0.029	0.008	-0.004	0.006	-0.003	0.006
Mother is short (height≤145 cm)	0.609**	0.077	0.653**	0.054	0.653**	0.054
Mother is thin (body mass index≤18.5 kg/m ²)	0.102	0.065	0.208**	0.056	0.207**	0.056
Mother has primary education	-0.061	0.148	0.001	0.072	0.002	.071
Mother has secondary+ education	-0.264	0.147	-0.031	0.077	-0.030	0.077
Family level factors						
Father has primary education	-0.050	0.087	-0.031	0.055	-0.031	0.055
Father has secondary+ education	-0.175	0.088	-0.232**	0.062	-0.232**	0.062

⁷The marginal effect for an observation with stunting probability equal to the sample average (0.314) is equal to $-0.092 \phi(\Phi^{-1}(0.314)) = -0.0033$.

Family wealth score						
Poorer (2 nd quintile)	-0.007	0.083	0.061	0.058	0.062	0.058
Middle (3 rd quintile)	-0.125	0.085	-0.068	0.063	-0.067	0.063
Richer (4 th quintile)	-0.220*	0.091	-0.155*	0.068	-0.154*	0.068
Richest (5 th quintile)	-0.592**	0.107	0.280**	0.081	-0.280**	0.081
Community level factors						
Rural area	-0.068	0.064	0.026	0.049	0.026	0.049
Barisal	-0.071	0.106	0.231**	0.085	0.232**	0.085
Chittagong	0.088	0.095	0.255**	0.075	0.254**	0.075
Mymensingh	-0.109	0.102	0.256**	0.082	0.256**	0.082
Khulna	-0.157	0.103	0.146	0.087	0.147	.087
Rajshahi	0.008	0.102	0.067	0.087	0.068	0.087
Rangpur	-0.075	0.105	0.020	0.084	0.020	0.084
Sylhet	0.162	0.098	0.388**	0.076	0.386**	0.076
Distance to nearest health Centre	0.009	0.006	0.007	0.005	0.007	0.005
Constant	0.151	0.272	0.796**	0.209	-0.772**	0.212
Observations	2994		4808		4808	

Notes: Standard errors (s.e.) clustered at mother level; * $p \leq 0.05$; ** $p \leq 0.01$.

Source: BDHS 2011/18.

Column 3 in Table 3 is a first step towards allowing for a correlation between the log birth interval and mother specific unobserved heterogeneity, following the approach of Mundlak (1978) for quasi-fixed effects panel data models. The error term in the stunting equation (consisting of an idiosyncratic error and a mother specific effect) is decomposed as $\varepsilon_{it} + \lambda \text{mean}[\ln(B_i)]$, where $\text{mean}[\ln(B_i)]$ is the mean of the log birth intervals for mother i over all her children of birth order larger than one observed in the data, and ε_{it} is a standard normally distributed error term, independent of the log birth intervals and other explanatory variables. In this way, the correlation between the mother specific effect and the log birth interval is explicitly modeled and is present if $\lambda \neq 0$. Column 3 shows that λ is not significant. The effect of the log birth interval is somewhat smaller in absolute value than in column 2 and less precise. It remains negative and not significant. The other estimates hardly change.

We now turn to the two equations model for stunting and preceding birth intervals for children of birth order higher than one, introduced in Section 4. We estimated several specifications of this model. Log likelihoods and values of goodness of fit measures AIC (Akaike Information Criterion) and BIC (Bayesian Information Criterion) are presented in Table 4. Note that a lower value of AIC or BIC indicates a better fit.

Table 4 shows that, according to both AIC and BIC, the models imposing exclusion restrictions (models 1 and 3) perform better than their respective counterparts models 2 and 4, which also add the variables in Z_{it} (gender of the previous child and dummies for no boys and no girls) in the stunting equation. Model 3 has the lowest BIC and AIC. Moreover, the estimate of $\Sigma(1,2)$ is significant (see Table 5 below). It therefore seems justified to consider model 3 as our favorite model, and we will refer to it as the benchmark model. To illustrate the importance of accounting for endogeneity of the birth interval, we will, however, also discuss some results of model 1.

Table 4. Goodness of Fit Criteria for Several Model Specifications

Model	Number of parameters	Log likelihood	AIC	BIC
1. Independent errors, exclusion restrictions	54	-5995.4	12098.816	12189.73
2. Independent errors, No exclusion restrictions	57	-5995.4	12104.816	12200.79
3. Correlated errors, exclusion restrictions	58	-5982.38	12080.77	12188.75
4. Correlated errors, no exclusion restrictions	61	-5982.02	12086.03	12202.32

Note: different specifications of the model in Section 4. Independent errors means $\Sigma(1,2)$ is set to zero. No exclusion restrictions means that Z_{it} in equation (2) is also added to equation (1).

Table 5. RE and Two-equations Model for Stunting (children of birth order larger than 1)

Covariate	Random Effects (RE)		Generalized Structural Equation Model (GSEM)			
	Stunting		stunting		Log birth interval	
	Coefficients	s.e.	Coefficients	s.e.	Coefficients	s.e.
Child level factors						
Child age 6-11 months	0.084	0.112	0.079	0.109	-	-
12-23 months	0.689**	0.101	0.667**	0.100	-	-
24-36 months	0.811**	0.106	0.784**	0.104	-	-
37-47 months	0.755**	0.105	0.729**	0.103	-	-
48-59 months	0.458**	0.098	0.439**	0.096	-	-
Gender of child male	0.014	0.047	0.017	0.046	-	-
Religion of child, Muslim	-0.021	0.088	-0.012	0.087	0.017	0.027
Birth order	0.084**	0.029	-0.021	0.051	-0.211**	0.009
Preceding log birth interval	-0.108*	0.049	-0.611**	0.196	-	-
Mother level factors						
Age of mother at childbirth	-0.005	0.007	0.035*	0.017	0.078*	0.002
Mother is short (height $\leq$ 145cm)	0.771**	0.078	0.747**	0.078	-	-
Mother is thin (body mass index $\leq$ 18.5 kg/m ²)	0.259**	0.070	0.250**	0.067	-	-
Mother primary education	-0.002	0.086	0.020	0.085	0.041	0.028
Mother secondary+ educ.	-0.039	0.093	-0.044	0.091	-0.0156	0.030
Family level factors						
Father primary education	-0.039	0.068	-0.032	0.068	0.015	0.020
Father secondary+ educ.	-0.284**	0.079	-0.286**	0.078	-0.019	0.022
Family wealth score						
Poorer (2 nd quintile)	0.071	0.070	0.080	0.069	0.024	0.021
Middle (3 rd quintile)	-0.078	0.076	-0.069	0.075	0.015	0.022
Richer (4 th quintile)	-0.175*	0.083	-0.159*	0.082	0.024	0.024
Richest (5 th quintile)	-0.330**	0.110	-0.336**	0.098	-0.032	0.028
Community level factors						
Rural area	0.037	0.061	0.038	0.058	0.005	0.017
Barisal	0.278**	0.105	0.270**	0.104**	0.002	0.029
Chittagong	0.303**	0.093	0.268**	0.092	-0.053*	0.025
Mymensingh	0.306**	0.102	0.281**	0.101	-0.027	0.028
Khulna	0.176	0.105	0.220*	0.105	0.097**	0.029

Rajshahi	0.081	0.106	0.130	0.106	0.103**	0.029
Rangpur	0.031	0.102	0.063	0.102	0.068*	0.028
Sylhet	0.468**	0.097	0.338**	0.109	-0.227**	0.027
Distance to health center	0.008	0.006	0.008	0.006	-	-
Gender composition						
Previous child male	-	-	-	-	-0.012	0.017
No surviving boy	-	-	-	-	-0.060**	0.019
No surviving girl					-0.053*	0.021
Constant	-0.967**	0.255	0.306	0.551	2.503**	0.063
Observations	4808		4808		4830	

Notes: Standard errors (s.e.) clustered at mother level; * $p \leq 0.05$; ** $p \leq 0.01$.

Source: BDHS 2011/18.

Table 5. continued

	RE Model		GSEM			
	Stunting		Stunting		Ln(birth interval)	
	coeffic.	s.e.	coeffic.	s.e.	coeffic.	s.e.
St. dev. (error term)	1	-	1	-	0.440	0.011**
St. dev. (ind. effect)	0.652	0.125**	0.630	0.124**	0.164	0.025**
				coeffic.	s.e.	
Corr. (u_{it}, v_{it})				0.396	0.020**	
Corr. (α_{si}, α_{bi})				0.249	0.078**	
Observations	4808		4808		4830	

Notes: Standard errors (s.e.) clustered at mother level; * $p \leq 0.05$; ** $p \leq 0.01$.

Source: BDHS 2017/2018.

Table 5 presents the main results. First, for comparison, the first column shows the estimates of a random effects probit model for stunting, where the random effects are mother specific (capturing time persistent unobserved heterogeneity across mothers and their households) and birth intervals are treated as exogenous. The other columns present the estimates of our benchmark specification of the bivariate model, model 3 in Table 4. Column 2 presents the parameter estimates of the stunting equation (eq. 1) and Column 3 presents the results for the equation for the log birth interval (eq. 2). The main difference between the results for the complete model and the probit equation in column 1 is the coefficient on the log birth interval. The effect of the log birth interval is significantly negative in both models, but the effect is much larger in the bivariate model than according to the random effects probit equation. A Hausman test based upon comparing the two estimates confirms that the difference is significant (test statistic -2.7, p-value 0.000).⁸ This implies that exogeneity of the log birth interval is rejected and the

⁸ $(-0.611 - (-0.108)) / \sqrt{(0.196^2 - 0.049^2)} = -2.7$; Under the null that the birth intervals are exogenous, the test statistic follows a standard normal distribution.

bivariate model with endogenous birth intervals outperforms the random effects probit model in which birth intervals are assumed to be exogenous.

The finding that birth intervals are endogenous is also confirmed by the estimated covariance structure of the error terms and the mother specific effects in the two equations model. The estimated correlations between u_{it} and v_{it} and between α_{si} and α_{bi} are 0.396 and 0.249, respectively (see the bottom of the table). Both are significantly positive, and they are also jointly significant. Only if both were zero, the birth interval would be exogenous.

We therefore conclude that exogeneity of the birth intervals is rejected. Moreover, the estimates show that assuming exogeneity leads to a substantial underestimation of the importance of the preceding birth interval for stunting. We will therefore focus on the bivariate model in the remainder of this study.

The effect of the birth interval is not only statistically significant, but also substantively relevant: For an average observation (with stunting probability 0.314), keeping other characteristics (including unobserved characteristics α_{si}), a 10% increase of the birth interval reduces the probability of stunting by approximately 2.17 percentage points.⁹ Going from the 25th percentile (33 months) to the median of all birth intervals (52 months) would reduce the probability of stunting by approximately 9.9 percentage points,¹⁰ keeping other variables constant.

For the other explanatory variables in the stunting equation, the estimated coefficients generally do not differ much between the univariate model in column 1 and the bivariate model in column 2, as expected. They are also in line with the probit estimates in Table 2 and with earlier findings in the literature (see, e.g., Saha et al. 2019). The probability of stunting falls with the mother's age at previous birth¹¹ until approximately age 31 (the 90th percentile of mother's age at birth). It rises with birth order over most of the birth order range, in line with the stunting rates by birth order in Table 1. Neither the gender of the index child nor the religion of the family is significant.¹² Stunting is also more likely if the mother is unusually short. The stunting probability falls substantially with the education levels of both the father and the mother, but also with household wealth. As already emphasized by Saha et al. (2019), regional differences are substantial, with the largest stunting probability in Barisal, *ceteris paribus*.

The estimate of $\Omega(1,1)$ is 0.652 and significant, implying that almost one third ($(0.652^2/0.652^2+1)$) of the unexplained variance in (the latent variable that drives) stunting is captured by mother specific effects, while the other two thirds reflect unsystematic variation that is independent across children.

The third column of Table 5 presents the estimates of the log birth interval equation. The most interesting coefficients are those on the three instruments. Two of them are significant at the 5% level. Importantly, the three instruments are jointly significant (Chi2 value 13.76; p-value 0.0008), confirming relevance of the set of instruments as a whole. If the household either only has boys or only has girls, this

⁹- $0.611 \phi(\Phi^{-1}(0.314)) 0.1 = -0.0217$.

¹⁰- $0.611 \phi(\Phi^{-1}(0.314)) \ln(52/33) = -0.099$.

¹¹In this model we use age of the mother at previous birth, before the start of the birth interval.

¹²The positive sign of the dummy for a male child is in line with Thurstans et al. (2020).

significantly reduces the length of the birth interval, consistent with the notion that families desire a “complete family” with at least one boy and one girl, a stylized fact that has also been observed in developed countries (see, e.g., Angrist and Evans, 1998). The size of the reduction is 6% if there are no boys and 5.3% if there are no girls, and the small difference implies hardly any sign of son preference in this respect. The third instrument, gender of the previously born child, is not significant once the numbers of boys and girls (and other covariates) are kept constant.

The estimates for the other coefficients in the birth interval equation are largely in line with, e.g., van Soest and Saha (2018). Birth interval length falls with birth order but increases with the mother’s age at her previous childbirth. Birth intervals are shortest in Sylhet, where stunting is relatively common. They are relatively long in Khulna and Rajshahi, divisions with relatively low prevalence of stunting. On the other hand, wealth status of the household itself and education of the father and mother play no significant role for birth spacing. This suggests that regional economic welfare (and associated cultural norms) are more important for birth spacing than the individual household’s socioeconomic status.

The estimated variance of α_{bi} is 0.027 and significant, but much smaller than the variance of the error term in the same equation (v_{it}). Mother specific heterogeneity therefore plays a modest role here: it captures only 12% of the unsystematic variation in birth intervals.

Discussion and Conclusion

The large literature on determinants of stunting reports that age and gender of the child, birth weight and birth interval, mother’s education and nutritional status, household economic status and family size, and place of residence are significant predictors of stunting (see for example, Abdullah et al., 2023; Saha et al., 2019; 2020; Heady et al., 2015). Our study largely confirms these existing findings. Not all these associations necessarily reflect causal effects. In particular, birth intervals and stunting may be affected by similar unobserved cultural, hygienic or economic factors, that make birth intervals endogenous in an equation for stunting. Our study focuses on estimating the causal effect of preceding birth intervals on stunting among children of birth order two and higher. It is the first of its kind to explicitly account for endogeneity of the preceding birth interval, as well as for mother specific unobserved heterogeneity in stunting as well as birth spacing.

Our main result is the large negative causal effect of birth spacing on the probability that a child of birth order larger than one is stunted: an increase of the birth interval by 10% leads to a reduction of the stunting probability by 2.17 percentage points for an average observation, keeping other covariates constant. Previous studies using the BDHS surveys found adverse effects of birth intervals on the probability that a child is stunted, but they treated the birth interval as an exogenous variable (Kamal and Moniruzzaman, 2021; Khokon 2019). Our study shows clear evidence of endogeneity of birth intervals in the stunting equation and demonstrates that accounting for endogeneity leads to a much larger estimate of the birth interval effect on stunting. It fills a gap in the literature in showing that an

appropriate econometric model can lead to quite different conclusions about the importance of birth spacing policy for stunting.

Policy measures that improve socioeconomic status (wealth and education) have direct negative effects on stunting, keeping birth intervals constant. For example, compared to no education, secondary + education of the father reduces stunting by 10 %-points on average. And the *ceteris paribus* difference between the lowest and highest wealth quintiles is almost 12 %-points. On the other hand, improving socioeconomic status does not significantly increase birth intervals, so there is no evidence that the reduction of stunting works through the mechanism of longer birth intervals.

The large wealth effect is in line with descriptive results of Saha et al. (2019), who found that "when 20% children of the richest household were stunted in 2014, higher levels of stunting were observed among children in the poorest household during that period (56%)". Also, Saha et al, 2020 found a best scenario of the reduction of stunting with a step-wise improvement of wealth quintiles, parental education, household food security and eliminating large household size. Heady et al., 2015 showed factors that correlated with the decline in stunting in Bangladesh are: a rise in household assets; improvements in parental education; a reduction in open defecation; prenatal and birth delivery care; birth order and birth intervals; and maternal height. However, past studies have rarely quantified such effects keeping birth intervals constant.

We find that family composition influences birth spacing: The estimates suggest that families desire at least one daughter and at least one son, rather than a preference for boys. This seems to offer guidance for policy measures to educate couples towards gender preference. The existing demographic literature using data from India and Taiwan also showed evidence of a preference for a balanced sex composition (Pande, 2003; Lin 2009), but a son preference among Iranian women (Dehesh et al., 2020).

The other main driving factor of variation in birth intervals is formed by region specific factors where Sylhet is the hotspot of short birth intervals (Islam et al., 2022). Existing studies already revealed large variation in stunting across divisions. For example, children from Sylhet are much more likely to be stunted than the children of Dhaka division (Chowdhury et al., 2020). Short birth intervals are one of the reasons explaining this large stunting rate. The estimated indirect regional effect on stunting through birth spacing moving from Dhaka to Sylhet is almost 5%-points.¹³ On the other hand, the direct effect (keeping birth intervals constant) is even larger: 12%-points. This is an important finding for policy measures that can bring down stunting in a high-stunting division like Sylhet. Existing studies discuss the regional differences in stunting probabilities emphasizing differences in food supply due to agricultural productivity differences caused by the type of soil, for example (National Encyclopaedia of Bangladesh; Quddus et al., 2004), differences in Social Safety Net Program and for Government, non-Government aid (Chowdhury et al., 2020), differences in fertility levels and differences in women's autonomy and decision-making capacity (Saha et al. 2019; Basu et al., 2000; Amin et al., 2002; Chottopadhaya et al., 2007). Different from other studies, our study quantifies the effects and shows how household wealth, parental education, and regional differences

¹³- $0.611 \phi(\Phi^{-1}(0.314)) \times -0.227 = 0.0492$.

drive birth intervals and stunting. Better understanding the risk factors including short birth intervals that drive stunting probabilities in under-five children may help to attain the Sustainable Development Goal (SDG) in maternal and child health in Bangladesh.

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The Choice of First Destination for Immigrants: Determining Factors and the Immigration Policy in the Kingdom of Saudi Arabia

*By Shuruq Ismail Alsharif**

Economics is considered the most significant factor influencing the human behaviour of migration. Reports suggest that around 30% of Saudi Arabia's population are immigrants, mostly from Asian countries. This figure is high compared to other countries. Saudi Arabia aims to diversify its economy and reduce its dependence on oil as part of its Vision 2030. Therefore, the government seeks to attract more foreign investors. This paper examines immigrants' initial migration and destination choices. Focusing on migration in Saudi Arabia, the study aids in understanding how foreign-born immigrants congregate in gateways where resources are available. Immigration studies have focused on specific theories to understand the international immigration process. Ecological theory, assimilation theory, neoclassical theory, and new economics are among the most significant theories in this field. These theories aid in understanding Saudi Arabian migration in terms of the decision to relocate and the choice of destination. To achieve this study's objectives, all related and previous studies were reviewed according to the nature of this study. This involved discussing and focusing on the initial gateways chosen by first-generation immigrants. The researcher also used the Geographic Information System to design maps illustrating the population distribution in several Saudi Arabian cities.

Keywords: *population, immigration, gateways, assimilation theory, neoclassical theory*

Introduction

Population migration has endured throughout history with the creation of settlements and multicultural human societies. Its origins are linked to individuals' desires to overcome difficult living conditions such as poverty, deprivation, marginalization, and social injustice and look elsewhere for elements of a decent life. Because technology has "shrunk" the world, migration is no longer limited to geographically close areas. People now migrate to distant countries, such as the nearly 3.5 million Indians residing in North America, almost 1,160 miles from their home country (Al-Aouni 2022).

In addition, migration has developed rapidly in connection with communication innovation. This poses new social, economic, cultural, and political challenges for governments and decision-makers receiving goods and exporting to migration countries. According to the Organization for Economic Co-operation and Development (OECD) (2021), there were 281 million international migrants in 2020. Canada, the

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United States, and European countries such as France attract the highest numbers of international migrants due to historical migration patterns and their economic and cultural factors such as Canada's strong job market and multicultural policies, the United States' economic opportunities and entrepreneurial culture, and France's social welfare system and historical ties to former colonies (OECD 2021, Swaydi 2012).

International migration is driven by intertwined motives and factors pushing individuals to migrate to other countries to compensate for losses in their homeland. These motives can be natural (disasters, famines, epidemics, etc.), social (marginalization, dissatisfaction with living conditions, etc.), economic (poverty, lack of job opportunities, etc.), and political (wars, persecution, major conflicts, etc.). However, rapid demographic growth impacts natural resources negatively, causing social and economic problems (especially in underdeveloped countries) and driving people to migrate to richer countries to pursue better living conditions (cf. *repel migration factors*). Conversely, factors attracting migrants include incentives provided by the receiving countries and economic opportunities—the top attracting factor (Swaydi 2012).

Similarly, migration motives, together with destination selection, are not limited to economic, political, or cultural reasons, nor are they limited to social motives for eliminating poverty and seeking well-being. Rather, social networks (e.g., diaspora and migration networks), ethnic and linguistic ties, and geographical proximity play a decisive role in determining migration choices. According to Massey and Denton (1985), family and community ties in the destination country are crucial in facilitating migration and providing psychological and economic support to migrants. Moreover, shared cultural characteristics may influence migration decisions and determining destination countries. Zhou and Logan (1989) suggested that first-generation migrants tend to settle in areas with similar communities and cultural affinities to their homelands, allowing easier adaptation and integration into the host societies. However, motives and reasons for migration differ significantly among subsequent generations of immigrants; that is, the first generation tends to migrate for mostly economic reasons such as better job opportunities or escaping crises, while the second generation tends to evaluate their options for education and cultural identity.

Notably, Saudi Arabia is the top country in the Middle East in general, and in the Gulf in particular, in terms of attracting immigrants of various nationalities due to its thriving economy, rich social opportunities, and government policies regulating the status of expatriates and encouraging foreign investment. According to the General Authority for Statistics (2020), migrants represent about 38% of the Saudi Arabian workforce, a high percentage that reflects the country's strong economic position and its role in attracting foreign labor, particularly in sectors such as construction, domestic work, and healthcare. In contrast, immigration data for the United States shows that about 44% of new migrants are motivated by economic factors, such as seeking job opportunities or improving their living conditions, but also include factors like family reunification, educational opportunities, and political asylum (Pew Research Center 2020). This contrast highlights the fact that while economic factors are a key driver for migration to both countries, Saudi Arabia's focus is predominantly on labor migration, whereas the United States offers a more diverse set of motivations for migrants.

According to a United Nations (2020), there are around 281 million international migrants globally; 87 million go to Europe, and around 60 million go to North America. The United States has the largest number of migrants (51 million), followed by Saudi Arabia and Germany (13 million each), and Australia (8 million) (United Nations 2020). Saudi Arabia and the United States are significant destinations for migrants worldwide due to these countries' job opportunities, powerful economies, safe and stable climates, and unique educational opportunities. The oil- and gas-based economy of Saudi Arabia attracts foreign workers, while the United States offers wide-ranging economic and educational opportunities and a culturally diverse social environment.

Migration is a complex global phenomenon that presents significant challenges for governments and decision-makers worldwide. It is driven by a range of social, economic, and political factors, as individuals seek better opportunities, safety, and stability (World Bank 2020). The impact of globalization, particularly through advancements in communication, transportation, and the integration of global markets, has significantly accelerated migration flows. This global interconnectedness has made migration not only a critical issue for receiving countries but also a key area of study for researchers, policymakers, and international organizations. Understanding the driving forces behind migration and its consequences has become crucial for developing informed policies that address both the opportunities and challenges migration presents on a global scale (OECD 2021).

This study sheds light on migration to Saudi Arabia and the United States and the motives driving multi-national migrants' decisions when choosing host destinations. It determines the essential characteristics and skills of migrant workers and examines the challenges and opportunities they encounter. These insights, in turn, may enrich sustainable development plans in Saudi Arabia and help formulate better policies and programs related to migration issues between Saudi Arabia and migrants' original countries.

Statement of the Problem

International migration greatly interests governments and research institutions due to its positive and negative effects on both the originating and host countries. One area of significant debate is the impact of skilled or proficient migrants on economic development. Specifically, the migration of highly skilled workers in sectors such as technology, healthcare, engineering, and education is of particular interest. In host countries, proficient migrants can contribute to innovation, fill labor shortages, and drive economic growth by boosting productivity and expanding expertise in critical industries. Conversely, concerns are raised about the potential brain drain in originating countries, where the outflow of skilled workers may hinder local economic development, particularly in areas like healthcare and education. Understanding these dynamics is essential for shaping policies that maximize the benefits of skilled migration while mitigating potential negative impacts on both sending and receiving countries. Negatively, exporting countries may show significant losses in development plans, while positively, migration may form an

incentive for individuals to contribute to human capital to obtain better immigration opportunities.

Since the early 1990s, migration rates from developing countries to oil-producing and more developed countries have increased, making migration a prominent global economy feature. This prompted the International Labour Organization to analyze migration trends and incentives, especially for low-income developing countries, which are the main source of migrants. While the incentives are diverse, economic factors appear to be the most important. However, most studies on migration issues confirm that immigration tends to flow away from developing countries and toward countries that offer economic progress such as job opportunities and high wages (Ullah 2012).

The number of people migrating from their home countries is increasing for several reasons, including improved living conditions in the host countries, as well as better educational or job opportunities, and escape from harassment or disasters (Ali 2023). In 2022, there were 281 million international migrants. The most important factors driving their migration decisions were the demographic structures of their home countries, the availability of social networks, and the job opportunities in the host countries (International Organization for Migration 2022).

According to the International Organization for Migration (IOM) (2021a), there were over 30 million international foreign workers in the Gulf countries in 2020; the number of migrants exceeded the number of citizens of many of these countries. However, the Gulf countries, led by Saudi Arabia, have shown great commitment to sustainable development goals, adopting the Global Compact for Safe and Regular Migration. Most migrants move to Saudi Arabia as workers under temporary contracts and a sponsorship system, for which a number of reform legislations are established to prevent smuggling migrants and to protect them from abuse and exploitation. Social, economic, and political motives drive migrants' choice of destination in Saudi Arabia, with economics remaining the main motive to avoid poverty, unemployment, and insufficient income and to improve their living conditions. In some contexts, conflicts and political instability exacerbate these motives.

Migration studies address many theories highlighting the importance of migration, forming a triple gain for migrants and their home and host countries. Despite the diversity of these theories, there is no comprehensive theory explaining the motives and dynamics of migration. Similarly, the theoretical contributions explaining migration do not exceed models that merely explain some of its aspects. In his book *Sociology of Migration in the United States of America*, Duchac (1974) provided several assumptions about the attitudes of international migrants, most notably that most of them move short distances, that they are driven to major industrial and commercial centers, and that city dwellers migrate more than villagers and women migrate more than men.

Greenwood and McDowell (1992) aimed to identify the determinants of migration from 23 developing countries to the United States, confirming that high wages are the most preferred motive among other determinants, namely distance between countries, population in the destination country, and family members already living in the destination country. However, Nee et al. (1994) showed that economic factors and government policies play an important role in directing

migration to specific developed countries, forming basic determinants of migration. For Portes and Rumbaut (2001), there are differences between first and second generations of migrants concerning education and economic opportunities—second-generation migrants in the United States have higher educational levels (70%) than the first generation (40%), indicating an expansion in their job opportunities. Similarly, Victor (2013) focused on the central factors affecting migration flows, classifying them into social (quality of education, health services, etc.), political (freedom of expression, etc.), technical (easy communication and transportation, etc.), and economic factors (high wages, industrial progress, good job opportunities, etc.). He focused on economic factors as the initial and primary motive of global migration flows.

Holland and Peters (2020) argued that migration decisions are made in two stages: The migrant is driven by economic and political factors and conflicts to discover the gains that migration brings them, and the new opportunities in destination countries (e.g., government policies that support and sponsor incoming migration) push them to make the final decision to migrate to those countries. Finally, a study conducted by Global Migration Group (2021) found that about 75% of migrants prefer to move to countries with communities that share the same culture and ethnicity, which enhances the feeling of security and support.

This brief review makes clear a diversity in researchers' perceptions of the migration phenomenon. However, all of the examined perceptions hold that migration results from several factors. Studies on migration to Western countries, especially the United States, are numerous, but there is a lack of studies on migration to Saudi Arabia. This highlights the importance of this study, supported by the 2021 report of the IOM, which purports that 38% of the Saudi Arabian workforce is made up of immigrants. There is also a lack of studies connecting economic theories to their practical applications in the two different contexts of Saudi Arabia and the United States, creating a gap in the comprehensive understanding of migration. International migration is likely to remain the most important and complex global challenge, as the motives that drive migrants to new countries form an important criterion for policymakers. However, it is vital to understand the propensity to migrate to achieve universally legal, safe, and stable migration.

The growth in migration rates in recent decades in many receiving countries, including those in the Arab world (e.g., Saudi Arabia and other Gulf countries) and the Western world (e.g., the United States, France, and Canada), has sparked significant discussions in political, economic, and academic circles. Studies have explored various aspects of international migration, such as its driving forces, the reasons for migrant concentration in specific regions, its economic and social impacts, and its role in shaping the policies of host countries (Castles & Miller 2009, Koser 2016). Research has shown that while migration flows are often driven by economic factors, such as the search for better job opportunities, political and social factors also play an important role in migration decisions (Borjas 2017, Munshi 2020). In particular, Gulf countries, including Saudi Arabia, attract a significant number of labor migrants due to their oil-driven economies, while Western countries like the United States and Canada attract migrants for reasons ranging from employment opportunities to political asylum and family reunification (Swayd 2012). Despite the significant migration flows into and out of Arab countries, there

remains a notable gap in comparative studies between countries like Saudi Arabia and the United States, particularly regarding the motivations and influences behind migrants' decisions in selecting their first migration destinations. Moreover, although migration is a key phenomenon in the Arab region, it has not received adequate attention from Arab researchers (Swaydi 2012).

This study is concerned with the lack of a comprehensive understanding of how economic, social, and political factors influence decisions to migrate to Saudi Arabia and the United States. The study focuses on the factors driving migration, sheds light on the role of social networks in determining the initial migration destinations of Saudi Arabia and the United States, and analyzes the role of government policies in shaping migrants' experiences. The study's concern can be summarized as follows: What motives drive migrants to choose Saudi Arabia as their initial destination? To answer this, the following sub-questions are examined:

1. How can the theories illuminating migration in the United States explain the factors leading to the selection of Saudi Arabia—a modern country characterized by a continuous flow of migrants—as an initial destination?
2. How do government policies contribute to shaping migrants' experiences and destination choices?

The study is limited to the factors and reasons affecting migration decisions concerning Saudi Arabia from a theoretical and practical perspective. It highlights the most important theories that explain migration and links them to migrants' experiences in the United States. It also illuminates government policies that ensure migrants are offered support and opportunities for empowerment in both countries.

Research Methodology

First, this study applied a descriptive-analytical approach to examine the migration phenomenon and clarify the theoretical concepts related to it. Second, a critical approach was used to evaluate how well the theories of international migration are applied in the contexts of Saudi Arabia and the United States, specifically analyzing the extent to which these theories explain the patterns and motivations of migration in each country. Finally, an inductive approach was used to collect data on the migration trends in both countries by examining relevant case studies and statistical data.

- Previous studies on international migration.
 - Official reports and national statistical data.
 - International databases.
 - Geographic Information Systems (GIS) software to display geographical and descriptive information in maps and graphs to facilitate understanding of the interactions between migrants and their surrounding environments.
 - Spatial Analysis tools to explain complex concepts and migration dynamics.
- This was achieved by analyzing migrant distribution, which highlighted the

higher-density areas of migrant communities, identified the factors and purposes influencing the choice of destination, identified the effect of social networks on destination choices, and determined the possibility of directing policies and resources toward support programs for migrants in needy areas.

Migration Factors

Economic factors are the most prominent for migration, falling under what are known as “push factors”. These factors are unemployment, low wages, low standards of living, low health services, and low education quality. According to a United Nations (2020), almost 182 million migrants (more than two-thirds of all international migrants) reside in high-income countries that provide them with greater economic opportunities. Al-Dhafiri (2022) found that 70% of Arab-region migrants expressed their desire to migrate due to poor economic conditions, while security, educational, and political factors were considered secondary. Similarly, the Arab Barometer (2022) showed that difficult economic conditions dominate young people’s thinking in the Gulf region and increase their desire to migrate to countries that offer job opportunities and higher wages. In some countries, deteriorating political conditions (instability, wars, discriminatory policies based on religion or ethnicity, etc.) result in high rates of voluntary or obligatory migration. Sassen (2016) purported armed violence and local economic destruction as the main reasons behind the displacement of many Syrian, Iraqi, Afghan, and Somali citizens toward Europe. Similarly, Ali & Hamid (2017) argued that political unrest (revolutions, armed conflicts, etc.) worsens living conditions and causes people to seek safety and stability in other countries.

Push and Pull Factors

The above reasons and factors can be classified into two primary types:

- **Push factors in the origin country:** These are local factors that push people to leave their countries. They include poverty, unemployment, and poor health and education services. Al-Aouni (2022) indicated that poor economic conditions in countries such as Yemen and Syria are the most significant factor increasing migration.
- **Destination country attraction factors:** These refer to the advantages that receiving countries offer to migrants, such as higher wages, better education services, and government policies that enhance the rights of migrant workers. Center for International and Regional Studies (2011) showed that Gulf countries such as Saudi Arabia and the UAE are attractive destinations due to high wages and diverse economic opportunities.

Thus, economic and political factors are intricately intertwined in the Middle East, and economic challenges often occur when there is political instability. For

example, poverty and unemployment are economic push factors that result in social and political instability. This increases tensions and drives people to look for safe havens. In contrast, destination countries such as Saudi Arabia and the UAE offer strong attraction factors for migrants seeking better opportunities. This interaction between push and attraction factors shows a complex dynamic that reinforces regional migration flows.

Theory

International migration increasingly draws the attention of governments and academic institutions due to its profound impact on issues such as development, identity, integration, and social change. With the diversity of theoretical approaches in the field of the sociology of migration, researchers strive to analyze and explain the motivations behind international migration flows and their effects. However, they face a diverse accumulation of theoretical perspectives, reflecting the varied intellectual frameworks and ideological backgrounds of experts and academics in this field, alongside the complexity and uniqueness of migration as a phenomenon.

Micro-Level Migration Theories

Human Capital Theory

Human capital theory forms a key concept in migration research and highlights the importance of education and skills in making migration decisions. According to Miller (2017), highly educated migrants seek better job opportunities that explains why people from developing countries migrate to developed countries. This is attributable to investments in education, which yield greater benefits through improved job opportunities and increased income.

In the Saudi context, skilled labor represents a large part of the labor market. Abd El-Motaleb (2018) reported that many migrants in Saudi Arabia are highly qualified and contribute to the development of the national economy. Focusing on high skills aligns with the kingdom's Vision 2030, which aims to attract global talent and achieve sustainable economic development.

New Economy Theory

This theory focuses on the factors influencing individuals' decisions and considerations of gain and loss. While human capital theory explains migration as an investment in individuals, new economic theory expands on this by considering migration as a strategy for households or communities to manage risks and improve their economic stability, often through remittances or diversifying income sources. New economy theory expands on this by focusing on the family's role as a decision-making entity in migration. However, Massey et al. (1993) suggested that families use a migration to cope with economic risks, such as loss of income or rising living costs; that is, migration is seen as a means of improving a family's economic situation by the migrant-sending remittances, which in turn support the local economy in the country of origin.

Neo-Classical Economy Theory

Neoclassical economy theory explains how wage gaps influence individual migration decisions. Borjas (2017) found that large wage gaps between countries motivate individuals to look for better opportunities. This is clear in the Saudi context, where high wages in sectors such as construction and services are seen as attractive factors for migrants. These economic factors lead to an increased inflow of skilled labor, which is essential to support development and infrastructure projects in Saudi Arabia. Consequently, labor inflow is closely linked to wage gaps as individuals seek to improve their living conditions by moving to more productive and affluent work environments.

From a comprehensive perspective, these theories overlap in their explanations of the phenomenon of migration. Human capital theory focuses on how skills and education affect migration decisions, while neoclassical economy theory shows how families use migration as an economic strategy, highlighting the importance of wage gaps as a major factor in migration decisions.

Intermediate-Level Migration Theories

Social Network Theory

This theory suggests that social ties between migrants, e.g., families, friends, and cultural groups, play pivotal roles in facilitating migration and adaptation. According to Black (2021), a strong migrant community can facilitate integration into a host society by providing psychological and material support and sharing information about employment and housing opportunities. This, in turn, reduces the costs and risks of migration.

In the Saudi context, evidence shows that migrant communities provide significant support to new migrants. For example, many migrants move to areas where there are large communities from their origin countries. This increases their success in the local labor market and facilitates cultural adaptation. Al-Shammari (2020) asserted that migrants who join strong social networks have better opportunities for finding suitable jobs and social integration.

Social Identity Theory

This theory focuses on the factors that enable or inhibit migrants in receiving countries and emphasizes the importance of social ties between migrants and host communities. Black (2021) argued that social ties reduce migration costs and facilitate adaptation to new environments. Additionally, social identity theory, proposed by Bella (2015) shows that migration affects individuals' collective identity allows individuals to form new identities. Studies confirm that migrants integrating into host societies effectively achieve economic and social success (Dustmann & Frattini 2014). Research also shows that the interaction of migrants in Saudi Arabia with their local communities enhances social cohesion and creates a dynamic environment with cultural diversity (Kapiszewski 2006).

Social network theory and social identity theory overlap significantly in their suggestion that social networks help to form migrants' collective identities. By belonging to a strong migrant community, migrants reinforce their old cultural

identities and benefit from new opportunities. This creates a balance between integration and identity preservation, which is a vital dynamic in the Saudi context, where many migrants seek to adapt to the local culture while retaining their cultural heritage, reflecting the rich diversity of Saudi society.

Macro-Level Migration Theories

World System Theory

This theory focuses on the effect of globalization and capitalism on promoting migration. De Haas (2010) confirmed that globalization widens the economic gap between countries. Attracting foreign labor is part of the Saudi economic development strategy because migrants support vital sectors such as construction and trade.

Push and Pull Theory

Push and pull theory explains how the economic and social conditions in origin and destination countries affect migration flows; that is, push factors include unemployment, poverty, and persecution, while pull factors include high wages, economic opportunities, and quality of life. Afan (2018) argued that individuals in developing countries move to developed countries for better living conditions, showing that economic factors play a pivotal role in their migration decisions. For example, migration from low-wage countries to countries with high wages occurs because individuals seek to improve their living conditions by moving to places that offer better job opportunities.

In Saudi Arabia, pull factors such as high wages and economic opportunities are extremely important in attracting migrant workers. According to Borjas (2017), large wage gaps between countries indicate that migrant workers tend to move from countries with low wages to those with higher wages. Additionally, statistics from the Saudi General Authority for Statistics (2020) show that many migrants work in non-oil sectors, such as construction and services, where wages are relatively high and job opportunities are diverse. Studies on labor migration in the Gulf region (Kapiszewski 2006) confirm that these economic factors are major drivers for attracting migrant workers to the Saudi labor market.

The motivations behind migration continue to intertwine economic, social, psychological, and political factors. In the pursuit of developing a comprehensive sociological theory in the field of migration studies—one that keeps pace with global developments and reflects the interconnections among these various factors—new approaches and conceptual frameworks emerged during the 20th century. Among these is the circular theory or systems approach, first introduced by Akin Mabogunje. This framework considers all overlapping factors influencing migration, including economic factors such as wage increases and industrial growth; social factors like healthcare and education quality; political factors such as freedom and democracy; and technological factors like transportation and communication. Mabogunje further incorporated two novel elements: information exchange and mechanization (Victor 2013, pp. 26–27).

Additionally, Max Weber introduced the concept of urban citizenship in host societies, emphasizing the need to accept and recognize "the other". This concept

laid the foundation for what later became known as the transnational approach, one of the innovative frameworks for interpreting international migration. This approach centers on blending two distinct identities: the identity of the sending society and that of the receiving society. Furthermore, the transnational approach is closely tied to social network theory, which sustains the phenomenon of international migration and aids in understanding the factors behind successful migration experiences and the elements that enhance migrants' adaptation to their new environments.

From the above discussion, it becomes evident that theoretical perspectives on migration motivations and impacts vary. However, they all converge on viewing migration as a result of interconnected economic, geographical, social, political, technological, and environmental factors.

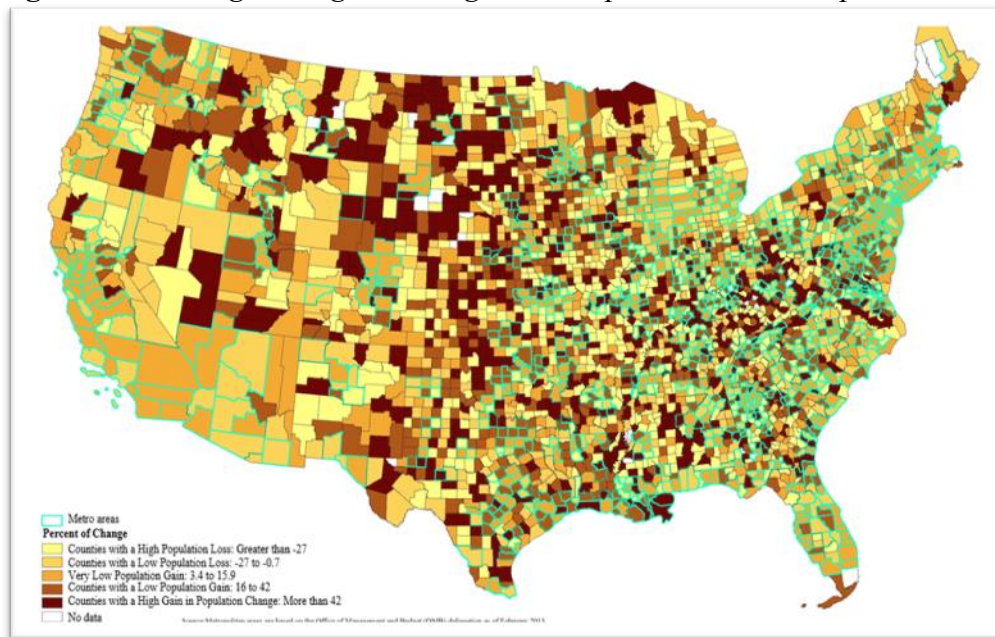
Migration to Saudi Arabia and the United States

Migration to the United States

The United States has been one of the most prominent migration destinations throughout history. For centuries, it has witnessed large influxes of migrants from all over the world. Since Christopher Columbus discovered the American continent, the United States has opened its doors to different nationalities and cultures, making it a melting pot of diverse traditions and origins. By 2000, the total number of foreign-born residents in the United States had surpassed 30 million, representing approximately 10% of the total population (U.S. Census Bureau 2020, Daniel 2003). According to the International Organization for Migration (2021b), the United States remains the leading remittance-sending country, with \$68 billion sent to migrants' origin countries in 2020. This highlights the United States' vital role in the global economy. Furthermore, the United States remains the leading destination for international migrants. The foreign-born population in the U.S. increased from under 12 million in 1970 to nearly 51 million by 2019 (Pew Research Center 2020). This growth in migration plays a significant role in strengthening the U.S. economy, as migrant workers fill critical labor shortages in sectors such as construction, housekeeping, and agriculture—industries often unattractive to local workers due to low wages and challenging working conditions (Idris 2018).

Social Networks

According to the Institute for Immigration, Globalization, and Education (2019), around 70% of new migrants rely on social networks to facilitate their move to the United States. These networks are essential for integration because they help new migrants adapt and provide them with the necessary information and support.

U.S. Gateways**Figure 1.** *Percentage Change in Foreign-Born Population and Metropolitan Areas*

Source: American Community Survey 2006–2010 and 2012–2016 five-year estimates. The Metropolitan areas are based on the Office of Management and Budget (OMB).

Figure 1 shows the percent change in foreign-born population and metropolitan areas. The metro data is based on the metropolitan areas taken from the Office of Management and Budget (OMB) delineation as of February 2013, the United States Department of Agriculture, the Economic Research Service, and the 2013 Urban Influence Codes. The OMB divided metro and nonmetro areas into two metro and 10 nonmetro groups. This scheme was initially established in 1993. The metro area includes large areas of more than 1 million residents and small metro areas of less than 1 million residents.

1. **California**, especially Los Angeles, is a popular destination for migrants due to its economic diversity and large Mexican and Asian migrant communities.
2. **New York** is a historical gateway for migrants, offering great economic and educational opportunities and a strong support network for migrants of all nationalities.
3. **Texas** is a prominent destination for Mexican migrants, attracting skilled and unskilled workers to its diverse and thriving economy.
4. **Florida** is famous for its migrants from Latin America, especially Cuba. This state offers employment opportunities in the tourism and service sectors.
5. **Illinois'** Chicago is an important center for migrants. They enjoy strong communities with long immigration histories.
6. **New Jersey** has a diverse population, making it attractive to migrants worldwide.

All these states support migrants through job opportunities, strong social networks, and a tolerant political climate. This confirms Massey et al.'s (1993) study that examines the factors that affect migration decisions. The states mentioned above represent traditional gateways for migrants and reflect the intricate ties between the social and economic factors that drive migration to the United States.

Government Policies in Migration Management

The United States distinguishes between two types of migration: legal and illegal. The government attempts to regulate the entry of immigrants through a family reunification policy, making it easier for migrants to join families already residing in the United States. Moreover, the government offers citizenship opportunities after five years of residence for those fluent in English and knowledgeable of the country's history (Kandel 2018). The U.S. government issues severe penalties for those employing illegal migrants, adopting a serious approach to combating illegal migration (Abdulrahman 2018). The Secure Fence Act of 2006 strengthens the US border, relying on advanced technologies such as satellites and hidden cameras. Government policies also tighten visa procedures for foreigners. Applicants are carefully screened to ensure they do not threaten national security (U.S. Government Publishing Office 2016). Furthermore, the Smart Border Action Plan between the United States and Canada was approved to combat illegal migration while maintaining freedom of movement between the two countries (Mamdouh 2008).

Reasons for Pulling

There are many reasons why the United States is an attractive destination for migrants. It has a diverse economy (the largest in the world), which provides job opportunities in sectors such as technology, medicine, and services. In addition, it is home to several prestigious universities, making it a preferred destination for students and researchers. The United States also provides a social environment that enhances freedom of expression and cultural diversity, allowing individuals to express their identities comfortably.

These social, political, and economic factors intersect to make the United States attractive for many migrants seeking better lives and demonstrate how government policies and social networks can influence migrants' experiences in the United States.

Characteristics of Migrants in the United States

Statistics from the U.S. Census Bureau (2020) indicate a significant gender balance among migrants, with women forming around 51% of all migrants. This indicates significant changes in migration patterns, with women increasingly contributing to the labor force and strong social networks supporting the integration of migrant women, improving their economic and social status.

Education level is an important factor that shapes the profile of migrants, particularly in how they contribute to the economy of the host country. According to the Pew Research Center (2019), highly educated migrants account for about 29% of the total migrant population in the U.S. Among them, 53% hold undergraduate or postgraduate degrees. These migrants are a vital part of the U.S. economy,

enhancing innovation and productivity in various sectors by applying their high skills and expertise to meet labor market needs.

Country of origin is a key element in understanding the demographics of migrants. According to the Pew Research Center (2020), Mexico is the largest source of migrants, accounting for 25% of the total migrant population, followed by India with 11%, and China with 5%. This cultural diversity enriches U.S. society, fosters cultural exchanges, and reflects the global nature of the United States. However, this diversity is not only demographic but also fundamental for innovation and economic growth. Data indicate that international migrants contribute significantly to the United States' economy. According to the U.S. Census Bureau (2020), there were 44.9 million immigrants living in the United States in 2020, representing 17% of the total U.S. population.

In addition, the Pew Research Center (2019) indicates that migrants contributed about \$1.9 trillion to the total local production (gross domestic product). This economic impact shows how migrants are part of the labor force and a significant economic growth driver.

The diverse genders, educations, and nationalities of migrants shape the fabric of US society. This enhances the United States' competitiveness and underscores the importance of crafting policies that support sustainable migration. By understanding these characteristics, officials and policymakers can develop strategies aligned with changing social and economic needs. A sustained flow of highly skilled migrants fosters future growth and innovation.

Migration to Saudi Arabia

Saudi Arabia is one of the largest migrant destinations in the Gulf region. Its foreign labor flows are essential to its demographic and economic structure. However, this demographic diversity influences many government policies and strategies for sustainable development and reduces dependence on oil revenues.

Demographic Structure and the Effect of Migrants

Statistics show that Saudi Arabia is home to 7.3 million foreigners, making it the largest country after the United States to receive migrants. This number represents a large percentage of the total population, as expatriate workers represented 41.6% in 2022 (Esbar Center 2023). These numbers show that migrants are not only guests but also an integral part of Saudi society. However, this necessitates consideration of migration policies.

Economic Motives for Migrant Workers

Economic motives are prominent in attracting migrants to Saudi Arabia. The IOM indicates that Saudi Arabia is developing strategies to strengthen the local labor market and reduce dependence on foreign labor. "Saudization policies" were adopted in the early 1990s, whereby the government set specific percentages for local employment in various sectors (Ministry of Economy and Planning 2023). Studies indicate that these policies are adopted to address unemployment issues,

reflecting new economy theory's influence on how families make migration decisions in response to economic challenges (Massey et al. 1993).

Social and Cultural Influences

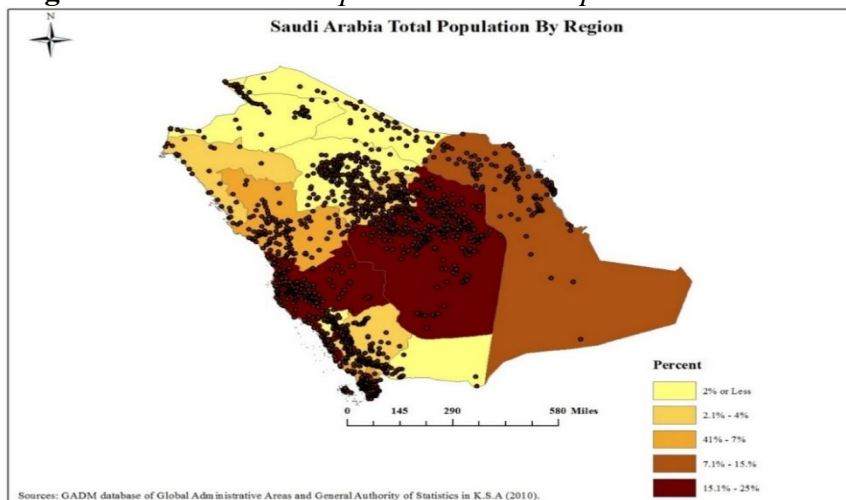
Data show that Saudi Arabian migration is no longer temporary but a permanent phenomenon affecting social and cultural identities. Social ties between diverse migrant communities and their families in their countries of origin are important in making migration decisions, which aligns with social network theory.

Main Immigration Gateways

The map in Figure 2 shows areas of population concentration, especially migrants, but it has no data showing the distribution of migrants in Saudi Arabia or their places of entry. This makes it challenging to determine their distribution. However, Riyadh, Jeddah, and Dammam are the main gateways of migration to Saudi Arabia. Riyadh is the capital and economic center, with many job opportunities (High Commission for the Development of Riyadh 2016). Whereas Jeddah is the principal maritime gateway with a large migrant community, and Dammam is an industrial center that attracts migrant workers. These cities demonstrate how pull factors, such as job opportunities and living standards, play vital roles in migration flows and align with push and pull theory.

Figure 2 shows the population density in the three major urban areas of Riyadh, Makkah Al-Mukarramah, and the Eastern Region. The density of migrants in the Eastern Region may be due to the density of oil companies. Makkah Al-Mukarramah attracts migrants for *Umrah* and *Hajj* (pilgrimage) annually, while Riyadh is the capital of Saudi Arabia and has more job opportunities, tourist attractions, and foreign investment (Riyadh Development Authority 2016).

Figure 2. Saudi Arabia Population with Metropolitan Areas



Source: General Authority for Statistics (2010).

Future Migration to Saudi Arabia

Expectations indicate that the flow of migrants to Saudi Arabia will continue to be linked to economic and social transformations. As the government moves toward

diversifying sources of income and moving away from oil dependence, the need for migrant workers will remain, especially in sectors lacking local workers (Arab Investment & Export Credit Guarantee Corporation 2019). The government may need to develop more effective policies to promote migrant integration that align with national development goals. Migration to Saudi Arabia demonstrates how interconnected economic and social factors influence demographic and economic structure. Therefore, understanding these dynamics will promote effective policies that support migrants and enhance the stability and diversity of society. Saudi Arabia remains a vibrant example of how migration affects development and social change, showing future challenges and opportunities (Arab League General Secretariat 2018).

Government Policies of Migration Management in Saudi Arabia

Through Vision 2030, Saudi Arabia seeks to improve the business environment and attract foreign investment, increasing the need for migrant workers in various sectors. This vision forms a comprehensive strategy that enhances Saudi Arabia's ability to attract skilled migrants, contributing to achieving the Sustainable Development Goals. These policies align with push and pull theory, focusing on the factors that push individuals to migrate from their countries of origin and those that pull them to Saudi Arabia.

Wage Protection System

In 2013, Saudi Arabia began implementing the Wage Protection System, which includes fundamental reforms in migrant workers' rights. This system requires employers to register workers' wages at the Ministry of Human Resources and Social Development and deposit them directly into their bank accounts, ensuring that wages are not delayed and that working hours are clearly defined. These measures agree with the push and pull theory as they reflect Saudi Arabia's commitment to protecting the rights of migrants and providing better working conditions, making it an attractive destination for skilled workers (Abdulrahman 2018).

Grace Period for Irregular Migrants

Saudi Arabia provides a grace period for irregular migrants to regularize their status, demonstrating its commitment to humanely addressing migration issues. These policies are consistent with push and pull theory because they reduce the pressures that may push people toward illegal migration, ensuring societal stability and improving conditions for migrants (United Nations Economic and Social Commission for Western Asia (ESCWA) 2015).

Partnerships with International Organizations

The Saudi Arabian government seeks to establish strong partnerships with international and regional organizations to ensure good migration management aligning with the Global Compact for Safe, Orderly, and Regular Migration objectives. These partnerships enhance the positive aspects of migration, supporting

push and pull theory by improving the work environment and rights of migrants (United Nations 2017).

Pulling Foreign Investment

As part of the government's efforts to make Saudi Arabia an attractive investment destination, the Investment Law has been updated to include regulations and facilities for foreign investors. This includes reducing administrative complexity, enabling investors to obtain licenses more quickly, and supporting innovative technology and renewable energy projects. According to the UNCTAD (2021), Saudi Arabia is expected to be the primary destination for investment in these areas. This trend reflects push and pull theory, which supports the view that economic opportunities enhance the flow of skilled migrants to Saudi Arabia.

Efforts for Combating Illegal Migration

The Saudi Arabian government's efforts to combat illegal migration are represented in the building of massive fences equipped with border surveillance devices, especially on the Saudi-Iraqi borders. In addition, Saudi Arabia enacts strict laws to combat illegal migration. These policy implementations reflect the trend toward reducing push factors as Saudi Arabia seeks to reduce the chaos resulting from irregular migration (Asbar Center 2023).

Pulling Reasons

There are many reasons why Saudi Arabia is a preferred destination for migrants, including cultural unity. The shared religion, culture, and opportunities for Muslims to perform *Hajj* and *Umrah* are very attractive for Arab migrants. Moreover, economic recovery and job opportunities make Saudi Arabia attractive to workers. Rizk & Halim (2021) show that these factors support push and pull theory, encouraging people to choose Saudi Arabian migration.

Government policies concerning Saudi Arabia's migration management reflect a solid commitment to improving the work environment and protecting the rights of migrants. By strengthening international partnerships and implementing wage protection systems, Saudi Arabia has created an attractive environment for migrants that enhances economic growth and achieves the Vision 2030 goals. These policies are consistent with push and pull theory; they focus on reducing the push factors by improving living and working conditions while enhancing the economic and social attractiveness of Saudi Arabia.

Characteristics of Migrants in Saudi Arabia

Saudi Arabia is a significant destination for migrants worldwide. Migration is pivotal in shaping the country's demographic and economic structure. Migrants in Saudi Arabia are of diverse genders, nationalities, and education levels, which contributes to the understanding of labor market dynamics and their effect on society. Statistics show that about 75% of migrants to Saudi Arabia are male, reflecting the economic nature of Saudi Arabia, which requires a male workforce, especially in the industrial and service sectors, where many jobs focus on physical and practical skills. According to the International Organization for Migration

(2021b) this high percentage reflects the cultural and social values that govern men's work in Saudi society. The nationalities of migrants in Saudi Arabia are diverse, including Indians (approx. 38%), Pakistanis (approx. 18%), and Egyptians (10%). This reflects the migration history of these countries, showing that economic and social relations between Saudi Arabia and these countries have seen continuous growth. Additionally, these percentages reflect the effect of economic factors, e.g., the need for labor in certain sectors, making Saudi Arabia an attractive destination for workers.

According to the General Authority for Statistics (2024), about 20% of migrants have higher educational qualifications, while many have academic backgrounds in engineering and medicine. However, about 80% of unskilled workers are in construction and agriculture. This structure reflects the Saudi economy's challenges in meeting its needs for skilled and unskilled workers, highlighting the importance of developing educational and training programs that meet market needs.

As demonstrated, the characteristics of migrants in Saudi Arabia show great diversity in gender, nationality, and education, reflecting the challenges and opportunities Saudi Arabia encounters in achieving its development goals. By strengthening migration policies that target skilled and unskilled workers, Saudi Arabia can better balance the labor market and promote sustainable economic growth.

Similarities and Differences Between Saudi Arabia and the United States in International Migration Experiences

International migration experiences are complex and require a deep understanding of the sending and receiving countries' political, economic, and social contexts. Saudi Arabia's and the United States' migration experiences can be related to push and pull theory and the economic contexts and social networks that influence those experiences.

Saudi Arabia focuses primarily on attracting expatriate workers and economic migrants to support economic development and infrastructure, but it opens its borders to those who are displaced and fleeing civil wars and political conflicts, such as Yemenis, Syrians, and Palestinians. Asylum laws in the United States provide protection and asylum to people fleeing danger or political, religious, or ethnic persecution in their countries. The United States also considers asylum a human right and adheres to international agreements related to refugee rights. Asylum applications are carefully examined to ensure their validity (UNHCR 2024).

Immigrants' Rights

Immigrants in Saudi Arabia have rights in the field of work and companies must commit to providing safe and appropriate working conditions. Migrants are also entitled to legal protection in the event of any violations against them. Immigrants in Saudi Arabia also enjoy rights in the field of health care and access to basic medical services, while everyone in the United States enjoys basic rights regardless of their immigration status. The most prominent rights of immigrants in the United States are:

- The right to safe housing.
- The right to a safe and fair work environment.
- The right to free public education regardless of immigration status.
- The right to health care.
- The right to move freely within American territory provided that they obtain an appropriate identity card (Human Rights Watch 2020).

Saudi society maintains local values, traditions, and culture. Cultural integration requires immigrants to understand and respect these values. The Arabic language is a major factor in the process of integration into Saudi society, as it facilitates communication with local residents and participation in daily life, and coexistence in a spirit of tolerance and respect, in addition to the impact of social networks in supporting and facilitating the processes of attraction and integration into Saudi society (Saudi Arabia - Migrants & Refugees Section 2023).

Work Visa Policies for Foreign Workers

In Saudi Arabia, employment is governed by a contract that specifies the worker's job and salary, which is certified by the Saudi Chamber of Commerce and the Ministry of Foreign Affairs (Ministry of Human Resources and Social Development (2024)). Work visas are typically valid for one year and can be renewed annually as long as the worker remains employed (Ministry of Human Resources and Social Development 2024). Expatriate workers are also allowed to bring their immediate family members (spouse and children) to live with them in Saudi Arabia. Additionally, there are regulations such as prohibiting outdoor work during the hottest part of the day in the summer. A 2013 decision concerning domestic workers mandates that employers pay wages on time, grant weekly rest days, set working hours, and improve living conditions.

Types of Visas

The Saudi tourist visa for short-term tourism activities is a multiple-entry visa valid for one year. The Saudi work visa allows entry into the kingdom for 90 days, during which time the foreign employee must apply for a Saudi residence visa in order to work and live for a longer period, up to one year, and then renew it. The Saudi student visa is granted to foreign students who enter the kingdom to enroll in educational activities. It is available to citizens of more than 160 countries and provides short-term and long-term student programs based on the degree or training that the foreign student will be enrolled in. The Saudi premium residence visa is granted to foreign citizens wishing to invest in Saudi businesses without the need for a Saudi sponsor. The Saudi family visit visa is granted to Saudi citizens and legal residents wishing to host a first-degree relative on a short-term visit. The Saudi personal visit visa is granted to Saudi citizens wishing to host friends in the Kingdom of Saudi Arabia on a short-term visit that is neither related to family nor

related to work. The sponsorship system in Saudi Arabia has a significant impact on the movement of migrants and their rights. Under this system, expatriate workers are tied to their employer, and their ability to change jobs, leave the country, or even bring their family members depends on the employer's approval. This system can restrict the freedom of movement for migrants, as they often rely heavily on their sponsor for permission to make important life decisions (Ministry of Human Resources and Social Development 2024).

Under the sponsorship system in Saudi Arabia, migrants' freedom of movement and ability to choose employment are often limited. This residence dependency means that migrants are highly reliant on their sponsors to secure basic services, such as residency and the completion of administrative procedures (Ministry of Human Resources and Social Development 2024). However, in recent years, the Saudi government has introduced reforms to the labor and residency system aimed at improving conditions for migrants and reducing their dependence on sponsors. These changes align with global trends, granting workers more freedom to move and seek employment in new job opportunities without needing their sponsor's approval, unless the sponsor retains specific rights over them (Ministry of Human Resources and Social Development 2024).

Related to Irregular Immigrants

In 2013, the Saudi government granted a grace period for irregular immigrants to regularize their status. During this period, those who left the country were exempted from residency fees, work permits, and other fines that had been previously imposed on them. However, once an undocumented immigrant is caught, they are arrested, fingerprinted, and deported. Additionally, Saudi Arabia has cooperated with the State of Djibouti to combat illegal immigration, as Djibouti serves as an important transit point for irregular migrants and is located close to the Yemeni-Saudi border.

The Saudi government has used the media to raise awareness of the dangers of irregular migration in several languages including Arabic and Urdu. The impact of development plans such as Vision 2030 on migration patterns. Saudi Arabia's Vision 2030 plan is a comprehensive initiative that aims to transform and modernize the kingdom's economy and diversify its sources of income away from its current reliance on oil. Vision 2030 could impact migration patterns to the kingdom as follows:

1. Employing citizens: Vision 2030 aims to increase employment among Saudi citizens and encourage them to participate in the labor market, which could reduce the need for expatriate labor in some sectors.
2. Improving the work environment: By developing the work environment and improving education and training opportunities in the kingdom, opportunities available to Saudis could increase and thus reduce the need for expatriate labor.
3. Diversifying the Saudi economy: Expanding non-oil sectors could encourage the attraction of more expatriate labor in sectors that require additional allocations.

4. Stimulating foreign investment is a key component of Saudi Arabia's Vision 2030. By attracting foreign direct investment, Vision 2030 aims to create job opportunities for expatriate labor, particularly in the country's development and economic transformation projects (Saudi Development Authority 2021).

Related to the United States

Green card visa for employment is granted to temporary immigrant workers. The diversity lottery is granted to permanent immigrant workers. Immediate family members is a type of visa issued for the purpose of reuniting families and relatives.

The student visa is granted to foreign students and those on scholarships from academic institutions. Refugee status is granted to individuals who are fleeing persecution and seeking asylum (USCIS n.d.).

Type of Efficiency

The quality of skills among migrants varies significantly between Saudi Arabia and the United States. In Saudi Arabia, there is a higher concentration of unskilled laborers, particularly in sectors such as construction and agriculture, where they make up the majority of the workforce. This trend aligns with Saudi Arabia's economic needs, as the country rapidly develops its infrastructure and diversifies its economy. In contrast, the United States attracts a larger proportion of skilled migrants, especially those in fields related to innovation, technology, and higher education, who contribute significantly to economic advancement and technological progress.

Gender

Approximately 75% of migrants to Saudi Arabia are male, reflecting the male-dominated nature of the economy, especially in sectors with high labor density. In contrast, the U.S. labor market is more gender balanced. This difference illustrates how social networks influence opportunities and how social ties are critical in guiding migration decisions where male culture is dominant.

Pulling Reasons

The motives for migration vary significantly between Saudi Arabia and the United States. Migrants to Saudi Arabia tend to be motivated by the need to escape difficult conditions in their home countries, highlighting the influence of push factors. Conversely, the United States is seen as an attractive destination for migrants due to educational and professional opportunities. Therefore, pull factors are evident as migrants seek to improve their living conditions by taking advantage of economic opportunities in the host country.

Migration to the Kingdom of Saudi Arabia may be driven by spiritual and religious motives. Hajj and Umrah present opportunities for Muslims from all over the world to connect with each other, strengthening religious ties and solidarity among Muslims. A large influx of Muslims often occurs during the Hajj and Umrah seasons, leading to an

increase in temporary migration or religious visits. Additionally, the influx of pilgrims and Umrah performers supports local economies through spending on services and goods, creating job opportunities for citizens and residents in sectors such as hotels, transportation, and logistics. Some migrants travel to Saudi Arabia in search of spirituality and meditation. Hajj and Umrah bring together Muslims from various cultures and ethnicities, contributing to cultural exchange and enhancing cultural diversity. In short, migration to the Kingdom driven by Hajj and Umrah reflects a complex interaction between economic, spiritual, and religious factors, underscoring the importance of the spiritual and religious dimension in the context of migration to Saudi Arabia (Oxford Business Group 2024, Ministry of Hajj and Umrah 2024).

Social Inclusion

Social inclusion policies form one of the main differences between the two countries. The United States depends on a system that aims to integrate migrants more comprehensively into society, enhancing the “melting pot” concept. However, Saudi Arabia places more weight on national priorities, attempting to find solutions that meet the migration demands of all parties. This reflects the specificity of the Saudi experience in managing migration flows.

Furthermore, migration experiences in Saudi Arabia and the United States show similarities and differences in shaping migrants’ identities and experiences. By linking these experiences to push and pull theory, economic contexts, and social networks, future policies can better enhance migrant experiences in both countries, considering the needs and challenges of local communities.

Discussion

Saudi Arabia and the United States are significant destinations for international migrants. Both countries have high migration levels due to their powerful economies, diverse job opportunities, and attractive investment environments. In addition, both countries have social, political, and legislative factors that support migrants’ rights. Statistics demonstrate that the United States ranks first globally in terms of the number of migrants it receives, followed by Saudi Arabia.

Migration Motives

Migration motives in these two countries vary, and both push and pull factors overlap in influencing migrants’ decisions. In their origin countries, many migrants suffer from poverty, unemployment, persecution, poor living conditions, and political unrest. These factors push them to migrate in order to find better lives. In terms of pull factors, Saudi Arabia and the United States attract migrants due to their powerful economies, diverse job opportunities, and high wages, which make them preferred destinations.

Irregular Migration

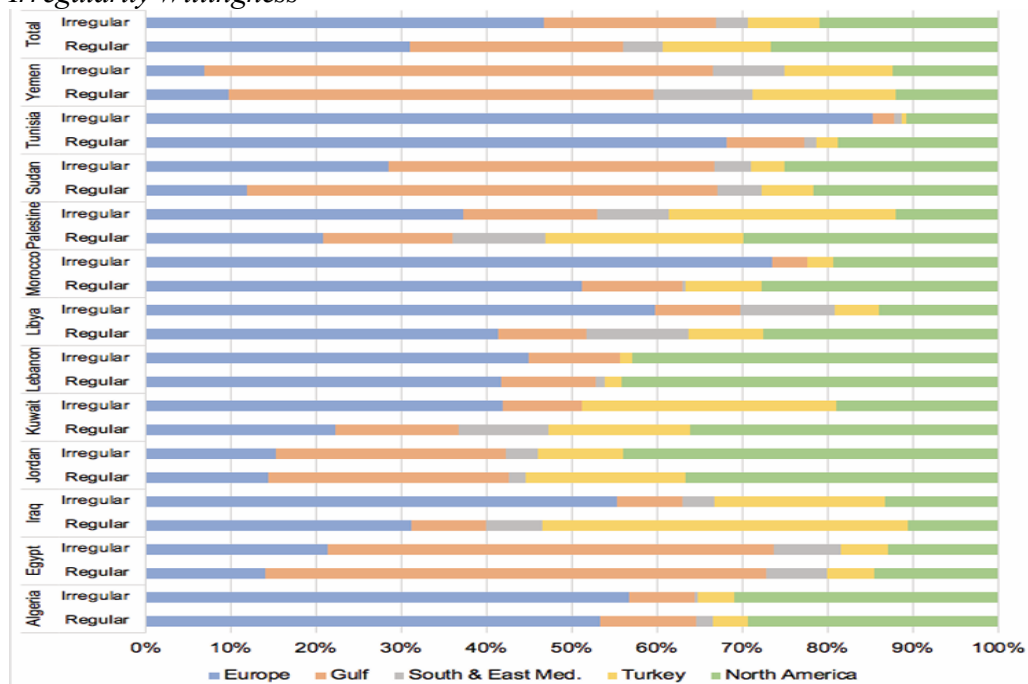
Irregular migration is illegal in Saudi Arabia and the United States if it opposes applicable regulations such as residency, labor, and border security laws. These violations result in penalties such as detention, imprisonment, and fines. This highlights the importance of adhering to local laws and the challenges migrants encounter when attempting to improve their living conditions.

Theory and Distance

Although René Duchac did not fully agree with these laws, statistical analyses from the United Nations Statistical Division indicate that international migrations tend to occur over relatively short geographical distances. For example, over 86% of migrants in Africa remain within the continent, while 80% of migrants in Asia are also of Asian origin (United Nations 2020).

However, migration rates today, particularly under the influence of globalization which has transformed the world into a “global village”, show that migration is no longer confined to geographically proximate areas. The following chart, based on an international and statistical survey conducted by the Arab Barometer across the Middle East and North Africa from 2006-2021, illustrates the preferred destinations for potential migrants by country and type of migration. This data can be used by researchers to challenge the plausibility of the distance theory. For example, over 50% of Algerians wishing to migrate to Europe despite the 2,183 km distance, and over 60% of Jordanians wishing to migrate to North America, despite the 9,852 km distance.

Figure 3. *Desired Destinations of Those Wanting to Emigrate, by Country and Irregularity Willingness*



Source: The International Centre for Migration Policy Development (ICMPD) (2022).

The data presented in Figure 3 illustrates the geographical distribution of preferred migration destinations among potential emigrants from various Arab countries, highlighting distinct patterns between regular and irregular migrants. Europe emerges as the most sought-after destination, particularly among irregular migrants from North African nations such as Algeria, Morocco, and Tunisia, where over half of potential emigrants express a preference for moving there. This trend can be attributed to several factors, including geographical proximity, historical ties, and the relative accessibility of irregular migration routes.

In contrast, North America appears to be a primary destination for regular migrants, especially from countries such as Jordan, Lebanon, and Iraq, where over 60% of those intending to migrate express a preference for the region. This inclination may be driven by the presence of well-established diaspora communities, as well as economic and educational opportunities that provide greater stability compared to other migration destinations.

Meanwhile, the Gulf region remains a key destination for regular migrants from countries such as Egypt, Iraq, and Sudan, reflecting the strong demand for both skilled and unskilled labor in these economies. Conversely, Turkey and the South and East Mediterranean region attract a smaller share of migrants relative to Europe and the Gulf, though certain national groups—such as Libyans—may exhibit a stronger preference for these locations due to geographical proximity and historical migration patterns. Overall, these migration trends underscore the economic and social disparities across the Arab world. Countries facing economic hardship tend to produce higher numbers of irregular migrants, while those with historical and socio-political ties to Europe and North America are more likely to engage in regular migration channels. This differentiation in migration preferences reflects broader structural dynamics, including labor market demands, legal migration pathways, and the role of transnational networks in shaping mobility patterns.

Data concerning the number and nationality of migrants contradict distance theory, which assumes a direct relationship between distance and migration. This theory suggests migrants prefer geographically close countries, but in reality, while migrants from countries such as Egypt choose Saudi Arabia, Lebanese and African migrants prefer the United States. This can be attributed to cultural, social, and economic factors that exceed geographic constraints, showing how developments in transportation and communications change traditional migration patterns.

Despite the complexities and varied types of migration, as well as the interwoven reasons for migration, the need for a comprehensive explanatory theory has become an urgent academic necessity and a global imperative. This does not contradict the acknowledgment of the difficulty in establishing a universal theory to explain the dynamics of migration, as "René Duchac" once stated:

"If we mean by the word 'theory' a construct that can encompass every observable migration movement, controlling for all the determinants, motives, phases of this movement, and predicting its outcomes, then it is clear that such a theory does not yet exist in this branch of sociology (migration sociology)".

However, the researcher believes that there is a significant gap between the scale of international migration, its increasing rates, and the contributions of academic

research in this field, particularly in Arab countries. This gap contrasts with the interest of governments and states in the phenomenon and their attempts to understand its causes and motivations. Therefore, it is essential to build upon the current theoretical propositions, seek to develop them, and contribute to creating a new, comprehensive theory in the field of migration that aligns with modern developments and aims to understand and analyze the dynamics of population migration and uncover the best methods to integrate it into the process of overall development.

The researcher also considers it essential, when attempting to build a comprehensive theory in the context of international migration, to account for the transformations that have taken place in this phenomenon in modern times. With the rise of globalization, migration has become increasingly complex, as multiple factors such as economic, political, cultural, and technological factors intertwine in shaping migration decisions. Thus, the critique of traditional migration theories lies in their inability to absorb the complex dynamics of this phenomenon within the context of modern globalization.

Additionally, it is crucial to reconsider the concepts of identity and integration in the context of migration, as migrating communities today are formed in a more flexible way, with individuals interacting with multiple cultures and not confined to their original identities or future destinations.

Government Policies

Both Saudi Arabia and the United States are committed to combating illegal immigration. Each adopts migration management policies that align with its national goals and security. These countries cooperate with international organizations and regional consultation groups by signing charters and agreements on reducing irregular migration.

Historical Events and Their Effects

Saudi Arabia witnessed a significant influx of migrants due to the Gulf War (1990-1991) and the Arab Spring revolutions (2010-2012). These events prompted many individuals to flee their home countries due to widespread devastation, political instability, and violence. The Gulf War in the early 1990s, followed by the political upheavals of the Arab Spring in 2011 and the years that followed, led to an increase in the number of refugees and displaced persons seeking refuge in Saudi Arabia, which provided a safer environment amid regional turmoil.

The migration experiences in Saudi Arabia and the United States demonstrate multiple complexities that reflect each country's unique social, economic, and political contexts. By understanding migration motives and the factors influencing migrant decisions, both countries can improve their policies to accommodate migrants more effectively, benefiting both society and migrants.

Limitations

This study faced certain limitations due to the lack of accurate data on migrants arriving from abroad, their movements, and their concentration in specific regions. These factors reduced the precision of the research, as having more detailed data could have provided a clearer understanding of migration patterns and population distribution. This would have allowed for more reliable conclusions regarding the impact of migration on different areas.

Conclusion

Migration is a complex social and economic phenomenon that affects societies worldwide. Migration experiences vary across countries based on economic, social, political, and cultural factors. This paper has reviewed the theoretical approaches used to explain the differences and similarities between migration experiences in the United States and Saudi Arabia.

According to push and pull theory, high wages, educational opportunities, and cultural diversity are the primary pull factors for the United States, which attracts migrants from countries that push people to leave because they are suffering economic and political problems. Saudi Arabia has a high demand for skilled and unskilled labor in vital sectors such as construction and energy, attracting migrants from countries such as Yemen and Syria, where unfavorable economic and political conditions increase the desire to migrate to Saudi Arabia to pursue better opportunities.

Highly educated migrants move to the United States to seek jobs in technology and medicine. In Saudi Arabia, Vision 2030 reinforces the demand for highly skilled migrants in the technology and renewable energy sectors, reflecting the country's investment trend. However, the influx of unskilled labor is still significant due to conditions in regions countries.

Cultural and social factors play crucial roles in migration experiences, and cultural trends and traditions affect the way migrants are welcomed in receiving countries. In the United States, cultural diversity facilitates the integration of migrants and enhances their sense of belonging. In Saudi Arabia, however, policies focus on integrating migrants into the Saudi society. However, they face challenges with rights and privileges because Saudi Arabia seeks to balance its national identity with its need to attract labor.

The theoretical approaches to understanding migration experiences in the United States and Saudi Arabia provide a comprehensive framework that highlights differences and similarities in push and pull factors. Understanding these experiences requires a careful analysis of economic, social, cultural, and political factors. This allows for a greater understanding of the phenomenon and enhances the effectiveness of migration management policies.

Therefore (and to the best of the researcher's knowledge), migration requires further study, particularly analyzing and addressing the challenges migrants encounter in host countries concerning cultural identity, social integration, and support networks.

Recommendations

Based on the theoretical concepts and intellectual premises addressing the motives for international migration, the framework of the previous data, and the current study's findings, the researcher introduces the most critical recommendations:

- Research is needed to dismantle and analyze all aspects of illegal migration, addressing migrants' motives and ways to combating illegal migration (by the Ministry of Interior, research centers, universities, and the Ministry of Human Resources and Social Development).
- Advanced technology and artificial intelligence software should be used to tighten controls and intensify follow-up of illegal entry operations, especially in border areas (by the Ministry of Interior, General Directorate of Passports, communications and technology companies, etc.).
- Policies and legislation should be directed to stimulate national and foreign investment (by the Ministry of Human Resources, the Ministry of Investment, the Ministry of Economy and Planning, and the Ministry of Information).
- Training is needed to raise awareness and proficiency for security service members to enforce laws that do not violate migrants' rights (by the General Directorate of Passports, the Border Guard Forces, the Ministry of Information, and the Ministry of Islamic Affairs, Dawah and Guidance).

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Rag Dolls and the Cultural Identity of Zoroastrian Female Society

*By Azadeh Pashootanizadeh**

After the collapse of the Sasanian Empire, the Zoroastrians of Iran formed a community united by a shared religious identity, later evolving into an ethnic group. The strategic importance of the Silk Road, combined with the familiarity of Zoroastrian textile merchants with this route, facilitated several waves of Zoroastrian migration. However, those who remained in Iran settled in various Silk Road stations and faced social pressures and discriminatory laws imposed by Islamic rulers. These circumstances led Zoroastrian women to promote textile and silk production as a means of preserving their cultural, gender, and ethnic identity. The garments of Zoroastrian women in Iran symbolize various aspects of the community's identity and encompass both intangible heritage and material culture, which are passed down through oral literature and traditions. Zoroastrian silk costumes and puppet theater performances, using Rag dolls made from recycled silk or cotton textiles, not only convey dress codes, production processes, and components of Zoroastrian women's clothing but also provide knowledge about medicinal plants and natural dyes. These practices contribute to the preservation of the Zoroastrians' unique language.

Keywords: Zoroastrian women, Iran, Textile, Rag dolls, identity.

Introduction

The official religion of all Iranians during the Sassanid period was Zoroastrianism. However, with the shift in the religion of the Iranians, Zoroastrians' religious and ethnic identity became intertwined, transforming them into an ethnic group.

Initially focused on preserving their religious identity, Zoroastrian women, facing increasing social threats, turned to textile production to ensure their survival and preserve both their religious and social identity. Meanwhile, some Zoroastrians, including silk and textile merchants, preferred migration due to their knowledge of Silk Road routes.

The role of dolls that migrated with settlers in preserving Zoroastrian women's cultural identity, oral literature, and traditions was crucial. These dolls incorporated textile techniques, medicinal and dye plants, garment components, dress codes, and color palettes in accordance with Zoroastrian culture.

This study examines aspects of Zoroastrian women's culture, such as the development of textile production, dress codes, and preservation through dolls

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designed to maintain gender and religious identities. Textile production and silk weaving were vital to their cultural and ethnic identity and served as a form of gender expression. Dolls representing fairies in oral traditions were also seen as protectors and metaphysical supporters.

The author, an Iranian Zoroastrian woman, offers an insider's perspective, providing insights into Zoroastrian culture that may not be fully accessible even to Zoroastrian men.

Literature Review

Iran's cultural heritage officially registered the Zoroastrian Bibi Kūk dolls as item No. 1517 in the National Inventory of Cultural Heritage in January 2018. However, the original registration file lacks comprehensive and detailed information about these dolls. While a few images attached to the file illustrate the stages of their creation, there is no explanation regarding their specific purpose or the reasons for their use. The Cultural Heritage Department of Yazd Province, responsible for the registration, has not distinguished between the silk and cotton rag dolls.

Jamsheed K. Choksy, a Zoroastrian from the Indian diaspora, has conducted an in-depth examination of the cultural geography of Zoroastrians in Iran, focusing on their religious and cultural foundations. Additionally, the identity of Zoroastrian women in Iran and their textile production has been explored in several Persian-language articles by Azadeh Pashootanizasdeh, which have been referenced in this study.

Katayun Mazdapour, an Iranian Zoroastrian woman, has concentrated her research on aspects of Zoroastrian oral literature. However, her work does not explore the relationship between dialectal language and anthropology. Therefore, her research cannot be referenced in relation to the study of rag dolls.

Methodology/Materials and Methods

The material culture related to Zoroastrian women's silk weaving and rag dolls has been gathered from private collections and museums, including the Zoroastrian Anthropology Museum in Kerman and the Zoroastrian History and Culture Museum in Yazd.

Semi-structured interviews, photographs, and documentary films from family albums and archives (including archives from the Ministry of Cultural Heritage of Iran, the National Library of Iran, the Islamic Republic of Iran Broadcasting Organization, and UNESCO) are among the key sources utilized in this research.

This interdisciplinary, descriptive-analytical, and qualitative research involved (1) library research, (2) fieldwork, and (3) the use of documentary films or archival images from personal or official collections.

Zoroastrianism in Iran

Zoroastrianism, originating around 3,000 years ago, was the dominant religion in Iran until the 7th-century Arab conquests. It was the state religion of the Sasanian Empire (224-651 CE). After the Arab conquest, most Iranians converted to Islam, and Zoroastrians became a minority. However, tribute payments by Sasanian governors helped protect Zoroastrians from forced conversion and preserve their places of worship (Choksy, 2012, p. 217).

Zoroastrianism remained dominant in eastern Iran, including Sistan, Khorasan, and Transoxiana, for nearly two centuries after the invasion (Choksy, 1990, p. 213). In the 9th century, a significant Zoroastrian presence was noted in Fars, Rey, Khorasan, and Kerman (Shahmardan, 1984, p. 7). During the Iranian Intermezzo (Persian Renaissance), Zoroastrian culture persisted across Iran, from Tabaristan to central Iran.

Abu Dulaf al-Ijli in the 9th century, along with numerous reports from the 10th century by Ibn al-Faqih, Ibn Hawqal, and al-Mas'ūdī, indicate that the central and southern regions of Iran were recognized as active Zoroastrian settlements in the country¹.

Zoroastrianism gradually lost its dominance after the fall of the Sasanian dynasty and became a minority religion by the 13th century. Over time, the Zoroastrian population dwindled to fewer than 10,000, with the faith concentrated in the desert cities of Yazd and Kerman (Stausberg, 2002a). In the 1970s, the population grew to around 25,000, with many settling in Tehran (Stausberg, 2002b). However, after the 1979 Iranian Revolution, many Zoroastrians emigrated, and today their population is estimated at under 20,000, comprising less than 0.03% of Iran's total population (Rivetna, 2013).

The Forced Migrations of Zoroastrians from Iran

During the Sasanian era, Khorasan and Tabaristan were key Silk Road trade centers in Iran. Zoroastrians in these regions continued their involvement in silk trade even after the fall of the Sasanian Empire (Al-Maqdisi, 1982, pp. 474-475; Ibn al Faqih, 1988, p. 87; Al-Jahshiyari, 1969; Bayhaqi, 2004; Al-Ṭabarī, 2005). The reports from the 10th and 11th centuries highlight their role in preserving silk's intangible heritage. Over time, Zoroastrians migrated, dispersing both within Iran and beyond, with their route following the Silk Road. External migrations of the Zoroastrians over the centuries, prior to the Iranian Revolution, were mainly to India and China. Zoroastrians migrated to China during the first and second periods,

¹For a detailed account of the geographical and cultural landscape of Iran during the 10th century, please refer to the works of several key historians and geographers. Ibn Hawqal's *Sorat al-ard* (1992) offers comprehensive descriptions of the earth's features, with particular focus on the regions of central and southern Iran. Similarly, Ibn Faqih's *Mukhtasar Kitab al-Buldan* (1988) provides a summary of the lands and their cultural significance in the same period. Additionally, Mas'udi's *Murooj al-dahab wa kaddan al-jawahir* (2005) explores the socio-cultural and economic contexts of the time, enriching the historical narrative of Iran. For further insight into the travels and experiences in 9th-century Iran, refer to Abu Dulaf al-Khazraji's *Safarhā-ye Abu Dulaf: seyri dar Irān dar qarn-e chahārom-e hejri* (1975), which is a firsthand account of a journey across Iran in the 4th century AH.

which belong to the pre-Sassanian era and shortly after the fall of the Sassanian Empire, and to India during the third, fourth, and fifth periods, which span from the fall of the Sassanian Empire to the 1970s.

China

Before and during the Sassanid Period

Iranian Zoroastrians established their temples in China long before the Tang Dynasty, during the Sassanian period and even earlier, as trade centers located near marketplaces and trade routes (Liu, 2007, p. 180). During the Tang period, Zoroastrian temples were located along the Silk Road, and historical sources report the existence of Zoroastrian fire temples in various parts of China, especially in Chang'an (Benn, 2002, p. 59). Parsian Village in Yangzhou remains as a reminder from this period. The village is named after a Zoroastrian Iranian merchant who traveled along the Maritime Silk Road during the Tang Dynasty, and it has a romantic story attached to it. The inhabitants of the village consider themselves descendants of Iranian Zoroastrian merchants. (The Circle of Ancient Iranian Studies, 2003)

The End of the Sassanian Era and Shortly Thereafter

Little is known about the Zoroastrians who migrated to China during this period, apart from the tombs of two Sassanid princes, Narseh and Peroz III, the latter of whom was recognized as the "King of Persia" at the Tang court in Chang'an. Additionally, historical records mention the existence of a Zoroastrian temple in Chang'an, which became a sanctuary for Zoroastrian refugees following the Islamic conquest of Sassanid Iran (Foltz, 2010, p. 95). After that, there is no clear trace of Zoroastrian silk traders in Chinese history. The only references to the killing of Zoroastrians can be found in a few Arabic sources that document the Guangzhou massacre (Gernet, 1996, p. 292).

India

Zoroastrians migrated to India in three waves and are categorized into three groups based on the time of their migration:

the Parsi (8th-10th centuries)

the Farsi (16th-18th centuries)

the Irani (19th-20th centuries) (Marashi, 2008)

Simultaneously with the Third Wave of Zoroastrian Migration from Iran to India in the late 19th century, Keikhosrow Shahrokh—whose mother was involved in textile weaving—established three schools for Zoroastrian girls. Furthermore, in 1903, another girls' school was founded by a Zoroastrian cotton merchant named Khosrow Shah Jahan. These institutions provided a conducive environment for

practical textile training among Zoroastrian girls (Hajji Akbari, 2015, pp. 13, 15). However, the lack of written instructional resources led the masters of silk weaving to form an association in 1925, under the leadership of a Parsi woman from India named "Zar-Banu" (Pashootanizadeh, 2022a, p. 134). The association began publishing educational materials specifically focused on textile production and weaving, with the aim of providing comprehensive training in textile arts and garment production to Zoroastrian girls. However, the 19th and 20th centuries were also marked by events both from outside and within the Zoroastrian community, which will be analyzed in the following section.

✓ The Industrial Revolution and the large-scale migration of Zoroastrians threatened their traditional textile industry. Weavers migrated, and industrial fabrics replaced handwoven textiles. Migration also endangered the preservation of the dress code and cultural identity of Zoroastrian women, leading to their gradual erasure. To preserve their traditional dress code, Zoroastrian women created portable dolls resembling small mannequins, serving as reminders of their cultural identity as migrating women in a foreign land. Given that the Industrial Revolution brought changes to women's clothing styles in line with shifts in lifestyle, Zoroastrian women created rag dolls as models to teach the proper way to wear their traditional costumes. The costume of Zoroastrian women was incompatible with the new lifestyle brought about by the Industrial Revolution due to its diverse components. As a result, even in the sewing of these dolls, Zoroastrian women adhered to a miniature format of their traditional garments to facilitate the replication of the clothing pattern for making garments in full size (see Figure 1).

Some types of women's clothing, made from silk and cotton, included:

Dārāi Haprang (K²)/ Dārāi Haprang (Y³)/ Dārāi Haft rang (P⁴): A silk scarf (wimple) with seven colors.

Kīšī Sāyekūi (K & Y)/ Čārqaḍ (P): A feminine silk scarf with intricate patterns.

Sāyakūi (K)/ Soyakūi (Y)/ Dasmāl Sar (P): Silk handkerchiefs that women tied on the Maklū.

Kolta (K)/ Klūta (Y)/ Dasmāl Sar: The handkerchief that girls wore under the Lačak to cover their hair.

Rīsarī (K & Y)/ Rūsarī (P): Scarf.

Lačakī (K)/ Lačak (Y)/ Lačak (P): A small cap worn under the Maklū.

Maknū, Maklū (K)/ Maknā or Maqnā (Y)/ Maqnaeye boland (P): A very large scarf.

Perana (K)/ Perāna (Y)/ Pīrāhan (P): A woman's dress.

Šarvār (K)/ Savolī (Y)/ Šalvar (P): Floral pants that reach up to the ankles.

Šavāl (K & Y)/ Šavāl (P): Loose, floral shorts that are knee-length.

Sardārī (K)/ Kema/ Kemā (Y)/ qabā (P): A type of long robe (Pashootanizadeh, 2022b, pp. 18-19).

²K: Dari Behdini Kermani.

³Y: Dari Behdini Yazdi.

⁴P: Persian.

Figure 1a. *Silk Rag Doll***Figure 1b.** *Cotton Rag Doll, Photo by the Author, 2024*

✓ Due to increasing social pressures and discriminatory government laws against non-Muslims, especially Zoroastrians (Choksy, 2012, p. 222), Muslims refrained from purchasing agricultural products and selling textiles to Zoroastrians (Pashootanizadeh, 2021b, p. 72). As agriculture was a primary livelihood for Zoroastrians, women turned to textile work to support their families' economic survival. Zoroastrian men also shifted their focus from cultivating food crops to growing cotton, dye plants, and mulberry trees for sericulture to assist women in textile production.

✓ Zoroastrian women faced safety concerns and rights violations due to discriminatory laws. Government regulations mandated specific dress codes, such as dark yellow or yellowish-brown clothing (Houtum-Schindler, 1882, p. 57) for Zoroastrians in Yazd and Kerman, in order to distinguish them from Muslims (Pashootanizadeh, 2020, p. 259). Zoroastrian women used luxurious silk clothing as a protective measure that kept them safe from danger. By mimicking the attire of elite Muslim women, they were able to prevent sexual assaults by Muslim men, as such assaults could have serious consequences.

Zoroastrian Women's Textile Legends

Zoroastrian women, utilizing the distinct language of the Zoroastrian community, created oral narratives with educational content that encapsulated elements of their intangible cultural heritage and oral traditions related to textiles. These legends were recited at specific seasons, periods and in designated settings and were categorized into various thematic groups based on the raw materials used in fabric production. For example, the Zoroastrian legends related to wool⁵ were narrated during winter nights in a place called “Čāressun/ Čārestūn”. The listeners of these stories included women of all age groups within the Zoroastrian community, ranging from wool weavers to those engaged in knitting (Mazdapour, 2017, p. 103). Since cotton and silk fibers were used to make summer clothes, stories related to these materials were told from morning until noon in a room called “Genze Pariūn” (Pashootanizadeh, 2021a, p. 92). This room was always kept clean because it was considered the dwelling of the fairies, and the attendees of the storytelling sessions were young girls and women of the Zoroastrian community. During the cold seasons, this room was exclusively used for the care of family members who became ill and were quarantined there until recovery.

Specifically, the stories related to silk were divided into two distinct categories:

- The Serpent King (explaining the duties of married women and mothers): intermediate difficult stages (weaving, natural dyeing, painting on fabric with natural colors, and implementing various techniques to produce fabrics).
- The Fairy King's Daughter (explaining the duties of girls): initial stages (preparation of raw materials for natural dyeing, sericulture, spinning, and sectional beam) and supplementary stages (embroidery and patchwork) (Pashootanizadeh, 2024, p. 127).

Puppet Theater as a Pedagogical Instrument

The insecurity felt by Zoroastrian women led to fairy protagonists with magical powers protecting them in stories. These stories, supported by puppet theaters using rag dolls, taught dress codes, garment wear, color palettes, and symbolic motifs. This method of storytelling effectively passed on silk weaving knowledge, preserved the Zoroastrian language, and taught women how to create garments for self-protection.

⁵For more information, see Pashootanizadeh, A., Vasiq, B., & Lezgee, D. H. (2010). The symbolic layers of Wahmaru's tablecloth story in Unwritten Fictions & Folktales Khoramshah of Yazd. *Literary Criticism Quarterly*, 3(11), 117-142. Available at <http://lcq.modares.ac.ir/article-29-4590-fa.html>.

Dari Behdini Language

Zoroastrian Dari, also known as Behdini or Gavruni, is an endangered Iranian language spoken by the Zoroastrian minority, who mostly live in Yazd and the surrounding areas, as well as in Kerman and Tehran. Zoroastrian Dari is a unique Iranian language due to its historical background and the large number of subdialects (Gholami, 2018, p. 195)

The oral nature of these legends makes the Zoroastrian language become an important factor in enhancing the verbal component compared to the non-verbal (Pashootanizadeh, 2024, p. 128). In addition, the stories played a crucial role in preventing the sudden death of the language. Even after the successive migrations of the Zoroastrians, these tales continued to help preserve the language. However, with the onset of the Industrial Revolution and the decline in the number of listeners, a gradual death of the language occurred⁶.

Classification of Rag Dolls based on Raw Materials - Summer Clothing

Zoroastrian women use two types of dolls in puppet theater, and the content of the stories presented varies depending on the materials used in their creation. These differences are more pronounced through the use of various sub-branches of the Zoroastrian language, which reflect the ecological environment of the Zoroastrians. Some Zoroastrian neighborhoods were suitable for cotton cultivation, while others were known as mulberry belts, ideal for sericulture. In this context, the relationship between language and ecology played a role in narrating stories related to cotton, using cotton dolls, or stories related to silk, using silk dolls.

A. Silk Rag Dolls

These dolls, representing silk fairies with a metaphysical role, are placed in Zoroastrian temples or sacred sites, known as “Pirān⁷”, associated with the tombs of the displaced Sassanian royal family who died while fleeing from the Arabs. The pilgrimage season to these tombs occurs in the spring and summer, when various plants are available. During this time, young girls gather plants from the mountains to use for stuffing the silk dolls.

The embroidery (Zartošti-dūzi) on Zoroastrian girls' silk garments is inspired by images of real plants, thus serving as a useful guide during the plant collection process for the girls. Elderly silk weavers narrate silk tales and perform puppet theater with silk dolls. Afterward, these dolls are placed in sacred tombs for pilgrims to take and offer a donation. In return, the pilgrims not only take a beautiful silk doll

⁶Also see Gholami, S. (2020). Guest editor's introduction: Endangered Iranian languages: Language contact and language islands in Iran. *Iranian Studies*, 53(3-4), 347-351. <https://doi.org/10.1080/00210862.2020.1721997>

⁷It appears that the term “Pariān,” meaning “fairies” in the Zoroastrian language, later evolved into “Pirān.”

to the "Genze Pariūn" room in their home but also acquire a first aid kit. Because the silk dolls contain medicinal plants inside them.

A.1. The Creators of Rag Dolls:

In each Zoroastrian household, several silk rag dolls were kept, which, during the illness of a family member, would have their seams opened to access and use medicinal plants. After the patient's recovery, they would make several Silk rag dolls and place them in the Pirān for use in puppet theater or in Zoroastrian temples. Both locations led to a similar fate for the silk rag dolls, as they would eventually make their way to the homes of the pilgrims. The scarcity of old silk rag dolls among contemporary Zoroastrians is partly due to the removal of their medicinal contents. The recovered patients who were donors or creators of these dolls are divided into several groups: Adult and underage girls and boys⁸, who are considered the children of a family; and women and men who were the mothers and fathers of the family.

Considering that each of the creators is classified into a specific traditional and gender group, and that they do not possess the same abilities in making the silk rag dolls after recovering from illness, these dolls were therefore made or commissioned in various ways.

Girls are categorized into adults and minors.

Underage girls:

Girls under the age of 12: They are supported by their mothers, and after recovery, the mothers make the Silk rag dolls as a token of gratitude for their child's recovery.

Girls between the ages of 12 and 15: Although they still wear cotton clothing to prevent skin allergies and are less familiar with silk garments, they make the Silk rag dolls as part of practical assignments, both in Zoroastrian girls' schools and during internships at silk weaving workshops. Therefore, it cannot be expected that the dolls will be flawless; however, they serve as a suitable tool for evaluating the quality and extent of learning in silk weaving techniques and complementary arts for luxury silk garments. The abundant access of this group to fabric remnants in silk weaving workshops, which included a complete system for producing silk garments for Zoroastrian women, was not only a valuable resource for their practical exercises but also contributed to sustainable development and the reduction of waste of natural raw materials.

Adult girls:

This group of girls, aged 15 and above, showcase their skills by creating silk rag dolls. The techniques they intend to use for making their wedding dresses are applied to these dolls, so that they have a preliminary model of their wedding dress before starting its production. In this regard, the silk rag dolls creations of this group

⁸In Zoroastrianism, the age of maturity for both girls and boys are considered to be 15, at which point they can choose their own religion and also, see Andrés Toledo, Miguel Ángel. Textiles in Zoroastrianism, in *Luxury and Dress: Political Power and Appearance in the Roman Empire and Its Provinces* (Universitat de València, 2013), 23-30, p. 26.

are exceptionally beautiful and eye-catching. Many of the pilgrims who choose these dolls end up proposing to their creators. (Fig 1.a)

Boys are categorized into adults and minors.

Both groups, as they are not the audience for fairy tales, and due to the separate educational systems for girls and boys in Zoroastrian schools, which cater to the different needs of each gender, are not generally capable of creating the silk rag dolls. Although many of them, due to their involvement in the silk trade on both a retail and wholesale scale, as well as in raw silk and silk textiles, are knowledgeable about the quality of various types of silk, they are not able to create these dolls.

Underage boys:

Boys under the age of 12: It follows a similar pattern to girls under the age of 12.

Boys between the ages of 12 and 15: After recovering from illness, they commission the creation of Silk rag dolls from the workshop managers, who are mostly elderly women highly skilled in silk weaving, but due to certain age-related ailments, these women primarily work as storytellers of silk fairy tales and managers of silk workshops. In exchange for paying the workshop managers' fees, this group transports silkworm feed from the mulberry orchards to the sericulture section of the workshops. This method of payment and service delivery takes place at the earliest opportunity after the dolls are made, coinciding with the sericulture season.

Adult boys:

This group is similar to the previous one, but due to their greater physical abilities, they are considered complementary to the previous group and engage in activities such as planting mulberry trees and cutting mulberry branches. In this regard, almost all adult boys over the age of 15 have contributed to the production of mulberry orchards. This strategy resulted in the transformation of the Zoroastrian habitats, which were conducive to sericulture, into a “mulberry belt” by the young boys.

Zoroastrian parents:

Fathers of the family: They act in two distinct ways: either they request the creation of the silk rag dolls from their wives and pay them with raw silk equivalent in weight to the doll, or they commission the creation of the dolls from elderly managers of silk weaving workshops and, instead of paying wages, repair damaged loom parts or engage in the renovation of the workshop environment. The first method is typically chosen by silk merchants, while the second is carried out by farming men.

Mothers of the family: They create different types of silk rag dolls from their damaged or worn-out silk garments. Unlike the other versions, these dolls are not filled with medicinal plants; instead, they are filled with dye plants used for traditional dyeing. Given the importance of purity⁹ in Zoroastrianism and the second-hand nature of the silk fabrics used in the creation of this type of doll, these

⁹Purity is one of the most important themes in Zoroastrianism (Pashootanizadeh, 2024, p. 125).

dolls are never taken to sacred spaces. However, they are purchased by dyers as protective fairies for dyeing workshops. The money paid for these dolls was used to print books on religious and textile content. Due to the mothers' desire to preserve natural materials in accordance with sustainable development patterns, cotton textiles are sometimes used in the creation of these dolls, and some parts of the clothing are made from cotton fabrics.

B. Cotton Rag Dolls

The creation of this type of doll was specific to the female community; however, different forms of these dolls represented various stages of a woman's life. Unlike the Silk rag dolls, which is exclusive to the Zoroastrian community, the cotton rag dolls is produced jointly by Muslim and Zoroastrian women. Another difference is in their placement, as the Cotton rag dolls is not placed in sacred spaces, and therefore, no fee is paid for it by the pilgrims. However, there is a profound difference in the purpose of production between the Cotton rag dolls made by Muslim women and that made by Zoroastrians. (see Figure 2.)

Figure 2. *The Cotton Rag Dolls, which is created simultaneously with the onset of a Girl's First Menstruation*

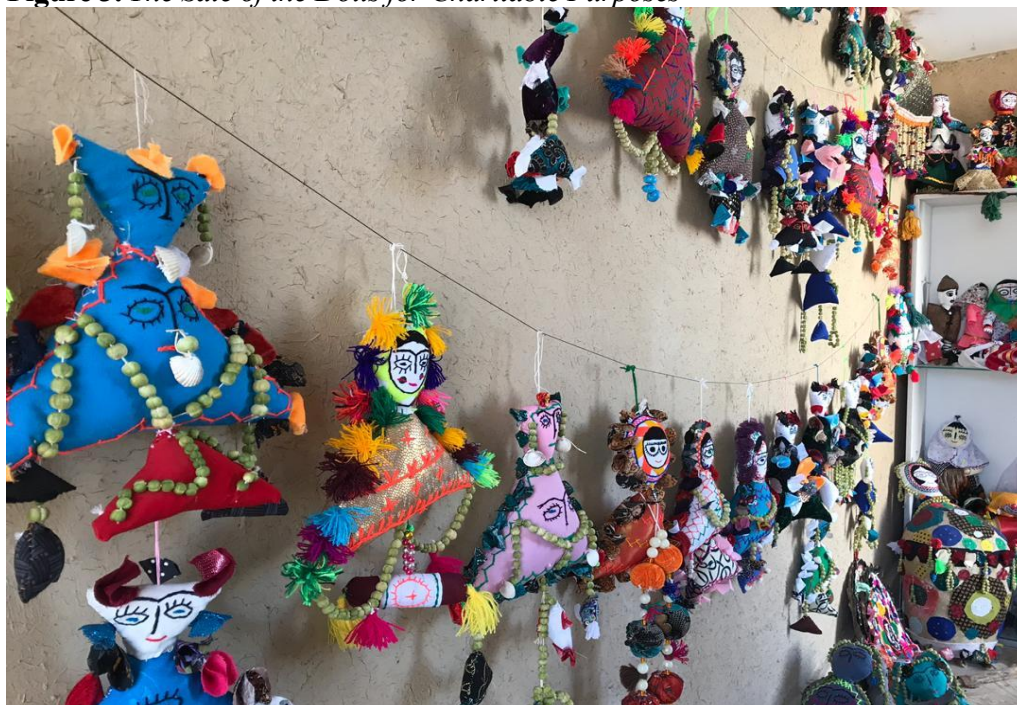


Source: Photo by the author, 2024

The Creators of Cotton Rag Dolls

The first time a Zoroastrian girl creates this type of doll coincides with her first menstruation, marking her entrance into womanhood. She then gifts the doll to girls who have not yet reached puberty, thus serving as a form of premonition for other girls, helping them become aware of the signs and process of puberty. The design of these dolls is not based on traditional silk garments. Instead, they are made with various types of cotton fabrics and filled with cotton. The intended purpose of these dolls is to serve as children's toys, and they are not used in puppet theaters related to cotton stories.

The abstract shapes of these dolls, which are made by combining geometric forms, are created by women who are going through the pre-menopausal stage (a combination of triangle/s and circle) or the menopausal stage (a combination of multiple triangles), and they are sold for charitable purposes. (See Figure 3.)

Figure 3. *The Sale of the Dolls for Charitable Purposes*

Source: Photo by the author, 2024

Conclusions

Zoroastrianism was the original religion of all Iranians prior to the fall of the Sasanian Empire. However, following the empire's collapse, Zoroastrians gradually transformed into an ethnoreligious minority. For several centuries after the advent of Islam in Iran—during a period often referred to as the Iranian Intermezzo—Zoroastrians continued to preserve their cultural and religious identity. They concentrated on two key Silk Road stations, Khorasan and Tabaristan, where they engaged in silk trade and sericulture. Over time, some Zoroastrians settled permanently in prominent Silk Road hubs within Iran, while others migrated abroad—India serving as an intermediary country, and China, regarded as the homeland of silk, becoming a major destination. Zoroastrian migrations to China occurred in two phases: the pre-Sasanian period and the early post-Sasanian era. Migration to India unfolded in three distinct waves: the Parsi (8th–10th centuries), the Farsi (16th–18th centuries), and the Irani (19th–20th centuries).

The Industrial Revolution in Iran and the decline of traditional textile production, along with financial support for the intergenerational transmission of silk weaving, increasing social pressure, and discriminatory government laws targeting non-Muslims, as well as the need for protection against sexual assaults by Muslim men, were among the key factors that contributed to the growing importance of textile and silk weaving in shaping the religious and cultural identity of Zoroastrian women. In this context, oral literature, through the use of puppets and puppet theater

performances, became a means for the intergenerational transmission of textile and silk-weaving knowledge.

The rag dolls, which were made from materials suitable for the warm seasons, were of two types: Cotton rag dolls and Silk rag dolls. The silk rag dolls, except for one, were filled with medicinal plants, resembling a form of first aid kit. An exceptional example was made by mothers from damaged silk garments. Due to the issue of purity in Zoroastrianism, these dolls were not offered to Zoroastrian sacred places; instead, they were filled with natural dye plants and served as protective spirits for dyeing workshops. Children of both genders, as well as their parents, played a direct or indirect role in the production of these dolls, which were dressed according to the dress codes defined in alignment with the religious and cultural identity of Zoroastrian women.

Cotton rag dolls are shared between Zoroastrians and Muslims, with the distinction that the makers of Zoroastrian dolls are either girls who have just started menstruating or women who are in the pre-menopausal or menopausal stage. These dolls do not adhere to the rules of silk rag dolls and are created in abstract forms.

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Is Greece Dying? Confronting the Population Challenge

*By Gregory T. Papanikos**

Few nations in the world have persisted continuously since the advent of recorded history, which—whether by coincidence or design—began with the ancient Greeks. The population of Greece has endured wars (both civil and national), prolonged periods of foreign occupation, pandemics, extreme poverty, and other hardships. Nevertheless, the process of reproduction persisted, ensuring the survival of the Greek national identity, which, according to Herodotus, the 'father of history,' was defined by common descent, language, religion, and cultural practices. Over thousands of years, the Greek population has declined during periods of hardship, particularly during wars, but historically it was able to recover within one or two generations after such events. However, in recent decades, Greece's population has begun to decline during what might be characterized as a modern golden age. For the past 75 years, Greece has experienced no wars or significant national crises, and per capita income has reached unprecedented levels. Yet, the population has continued to decline. The purpose of this paper is twofold. First, we present descriptive evidence of long-term trends, examining both the historical trajectory of the Greek population over the past 75 years (1950–2024) and its projected prospects for the next 75 years (2025–2100). Second, we propose policy recommendations which, if implemented, could yield positive effects on Greece's population in the short, medium, and long term.

Keywords: *Greece, population, migration, Isocrates, Herodotus, policies*

Introduction

Greece's population is declining. For the first time in the country's long and unique history, this phenomenon is occurring during peacetime and a period of significant economic growth. The population projections by the United Nations are grim for Greece. There are growing concerns that the very existence of the nation is at risk. If this trend continues, the Greek population could reach zero in less than two centuries.

The purpose of this paper is to analyze population fluctuations in Greece from the post–World War II period (1950–2024) and to present projections for the next 75 years (2025–2099). It also highlights that per capita GDP has been increasing, albeit not at a steady rate. The Great Recession, which began in 2008 in Europe, had a significant impact on Greece's population, primarily because many young people—including some with young children—were forced to leave the country in search of better labor conditions in Europe and beyond. The so-called "brain drain,"

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or loss of skilled population, should be the top priority of any policy aimed at increasing Greece's population in the coming years. While some of those who emigrated may never return, many would be willing to come back under the right labor market conditions. Recently, due to improved macroeconomic conditions in Greece, many people have been returning. However, as demonstrated in this paper, these improvements alone are not sufficient to resolve Greece's demographic problem.

The paper is structured into five sections, including this introduction. The next section examines population and per capita GDP trends over the past 75 years. The third section presents the United Nations' projections for the Greek population over the next 75 years. The fourth section discusses relevant policy issues, and the final section offers conclusions.

Greece's Population and GDP per Capita: The Past 75 Years (1950–2024)

The first half of the 20th century was marked by national wars of independence (1912–1913), Greece's participation in the First World War (1914–1918), a disastrous military expedition in Asia Minor (1920–1922), and wars against invaders—the Fascists in 1940 and the Nazis in 1941—as part of the Second World War. It also included strong resistance against the Tripartite occupation forces—Germany, Italy, and Bulgaria (1941–1944)—and a civil war (1944–1949). In my book on the Greek Civil War of the 1940s, I examined these developments in detail (Papanikos, 2020a).

All of these events had devastating effects: huge population losses due to wars, severe hardships and starvation, and tremendous destruction of Greece's economic infrastructure, which resulted in a very low per capita GDP. After 1950, a period of unprecedented peace and economic growth began in Greece, as I have explained elsewhere (see Papanikos, 2019 & 2020).

This section of the paper will examine (a) trends in Greek per capita GDP in the post-war period (specifically after 1960, when we have comparable and more reliable data from Eurostat), (b) the Greek population from 1950 to 2024, and (c) the possible relationship between population and per capita GDP.

The Long Tendency of Per Capita GDP

After the wars and the unstable political period of the 1950s, Greece experienced unprecedented growth in its per capita GDP, as shown in Figure 1. Several observations can be made by simply examining Figure 1.

First, the overall trend is positive. The actual number is estimated below. However, in the 21st century, we observe large fluctuations in GDP per capita due to the Great Recession and the pandemic, as explained further below.

Second, per capita GDP in the 1960s doubled, rising from 4.5 thousand constant 2015 euros in 1960 to 8.5 thousand in 1969. This period is often referred to in international literature as the "Greek economic miracle." In Papanikos (2025), I compared this period of the 1950s and 1960s with the recent period of economic

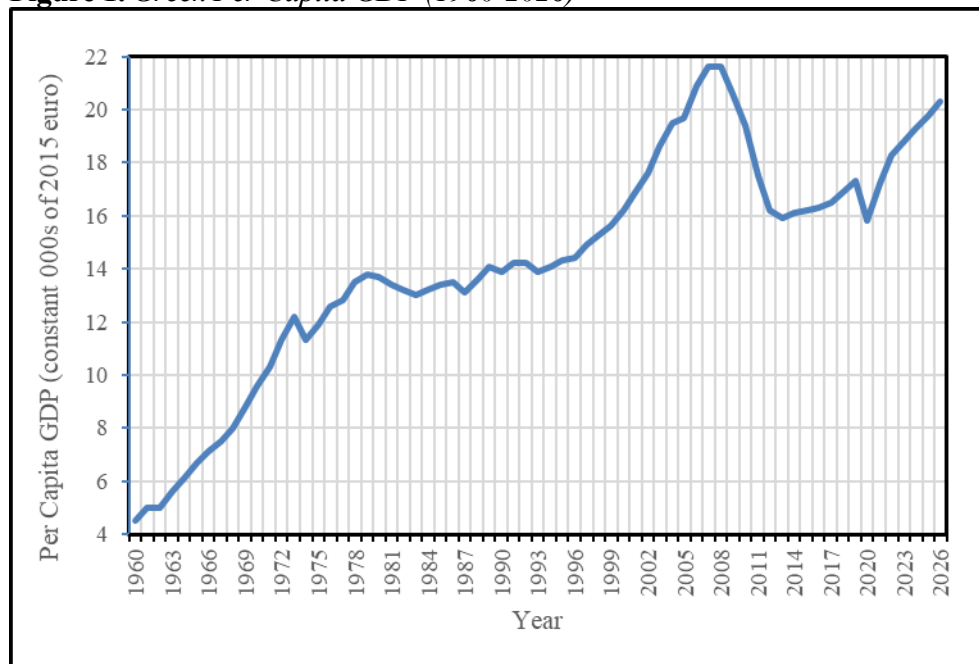
growth and concluded that, although the Greek economy is performing relatively well in terms of GDP growth rate compared to other eurozone countries, no one can seriously speak of an economic miracle today.

Third, the Greek economy was hit very hard by the Great Recession of 2007. In 2008, per capita GDP reached its highest-ever value of 21.6 thousand euros. By 2013, it had decreased to 15.9 thousand—a loss of 26.4%.

Fourth, COVID-19 also had a severe impact on the Greek economy, with per capita GDP falling again to €15.9 thousand in 2020. The demographic effects were equally significant. In Papanikos (2020c), I analyzed the demographic impact of COVID-19 across European Union countries.

Fifth, starting in 2021, the Greek GDP per capita growth rate recovered, and it is expected to reach 20.3 thousand euros by 2026.

Figure 1. *Greek Per Capita GDP (1960-2026)*



Source: Eurostat (AMECO database)

Assuming an exponential growth model, the growth rate of Greece's GDP per capita can be expressed as follows:

$$y = ae^{bt}$$

where:

y: GDP per capita

a: a constant term

e: Euler's number (2.71828)

b: the growth rate

t: time

e^{bt} expresses how the value of y grows over time at a continuously compounding rate of b .

We can linearize expression (1) by taking its natural logarithm:

$$\ln(y) = \ln(a) + bt$$

Using the data from Figure 1, the equation above is estimated, and the results are reported in Table 1. The annual growth rate of GDP per capita for the period 1960–2024 is 1.7%.

Table 1. *Exponential Growth Model of Greece's GDP per Capita, 1960–2024*

Variable	$\ln(y)$
$\ln(a)$	2.02
(t-statistic)	(39.54)
b	0.017
(t-statistic)	(12.76)
Adjusted R-squared	0.7164
F-Statistic	162.7
Prob(F-statistic)	(0.0000)

The Long Tendency of Greek Population

During the same period following the Second World War, Greece experienced an unprecedented stretch of political stability without involvement in wars, despite the seven-year dictatorship from 1967 to 1974. In 1980, Greece became a full member of the European Union, and in 2002, it was among the first countries to adopt the euro as its national currency. Earlier, in 1952, Greece had joined NATO and has since been a member of all major international organizations. The future appeared very promising. In the early years of this 75-year period, the Greek population was growing, despite significant outmigration to Western countries, North America, and Australia in search of better-paid employment.¹

Figure 2 displays Greek population statistics from 1950 to 2024. A third-degree polynomial provides an almost perfect fit for the population size over this period. This equation is also shown in Figure 2. The accuracy of the fit is demonstrated by the coefficient of determination (R^2), which is 99.19%.

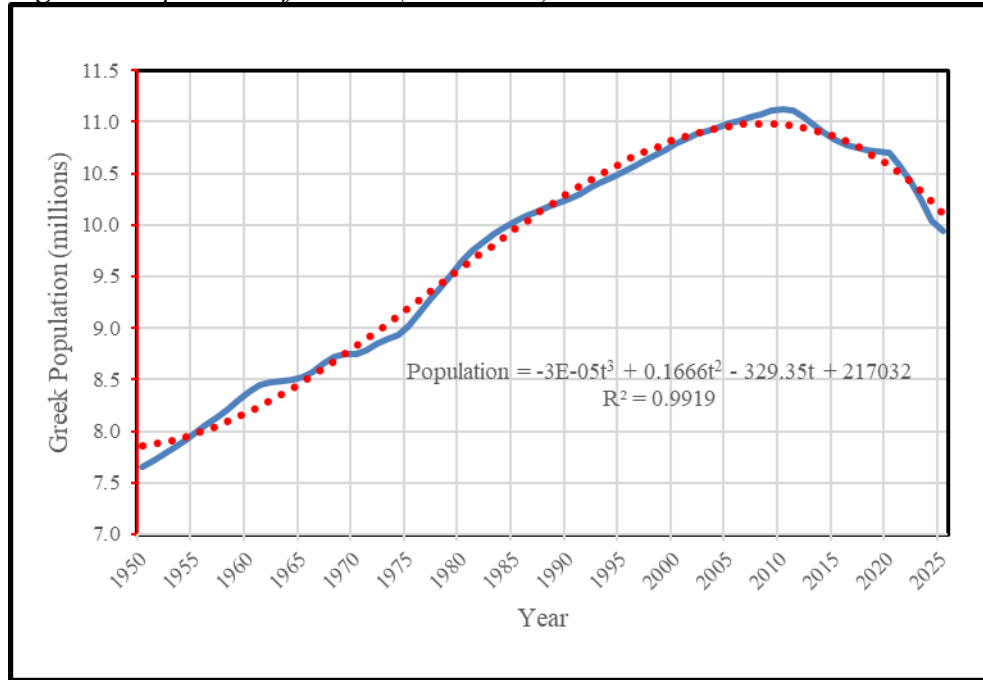
By coincidence, some trends are similar to the analysis above for per capita GDP, which might suggest a possible association between the two variables. However, as demonstrated below, there is no long-term relationship between them. This issue is further explored in the policy section of this paper.

Table 2 identifies four phases of population growth. In the first 30 years of the period under examination, the Greek population increased steadily from 7.65 million in 1950 to 9.65 million in 1980, corresponding to an average annual growth rate of 0.78%. This trend continued into the second phase, which I term the "declining growth rate" phase, meaning the population still grew during 1981–2010 but at a

¹In Papanikos (1991), I explained Greek outmigration to Canada during the early decades of this period as both an economic and political phenomenon.

slower rate, with an average annual growth of 0.49%. In 2010, the Greek population reached its peak for the entire period at 11.12 million. The final phase, from 2011 to 2024, marks a sharp decline in population of about one million people, or an average annual decrease of 0.72%. According to some reports, roughly half of this decline is attributed to brain drain, an issue discussed further in this study.²

Figure 2. *Population of Greece (1950–2024), in Millions*



Source: United Nations (<https://population.un.org/wpp/Download/>)

Table 2. *Phases of the Greek Population, 1950–2024*

Phase	Years	Min	Max	Average Annual Growth Rate (%)
Increasing growth	1950-1980	7.65	9.65	0.78%
Declining growth	1981-2009	9.75	11.11	0.49%
Maximum	2010	11.12	11.12	-
Declining population	2011-2024	10.05	11.05	-0.72%
Total Period	1950-2024	7.65	11.12	0.5%

Source: Author's calculations.

As mentioned above, it is noteworthy that both GDP per capita and population appear to follow a similar cyclical pattern: initially growing at an increasing rate,

²There are many aspects of population decline that are not examined in this paper. Population aging has both micro- and macro-level consequences and poses a significant problem in Greece, as it does in many other countries. For example, see Del Villar (2018) for a case study on the Philippines. Family-related issues are also relevant, as discussed by Szczepaniak-Sienniak (2014) in the context of Poland. In general, demographic and population challenges are faced by numerous countries. Although this literature is not reviewed in detail here, an indicative study is provided by Ileš and Karačić (2024) on Croatia.

then at a decreasing rate, and finally declining. Below, we examine whether these two variables are linked in the long run.

Is There Any Long-Run Relationship Between Population and per Capita GDP?

It is well established in time series analysis that, for two variables to have a valid long-run equilibrium relationship, they must be integrated of the same order. This means that both variables must exhibit the same degree of non-stationarity (e.g., both being $I(1)$, indicating they become stationary after first differencing). If the variables differ in their orders of integration, their stochastic trends will not align, and any linear combination of them will typically fail to be stationary. Consequently, no meaningful long-run equilibrium can exist, as the relationship would not revert to a stable mean over time, thereby violating the fundamental condition for equilibrium.

Therefore, the first step is to examine the stationary properties of per capita GDP and population. This is crucial because, for any meaningful long-run relationship to exist between these variables, they must be stationary or integrated of the same order. Table 3 presents the results of the augmented Dickey-Fuller unit root test, which determines whether each variable is stationary or requires differencing to achieve stationarity.

Table 3. *Results of Unit Root Tests*

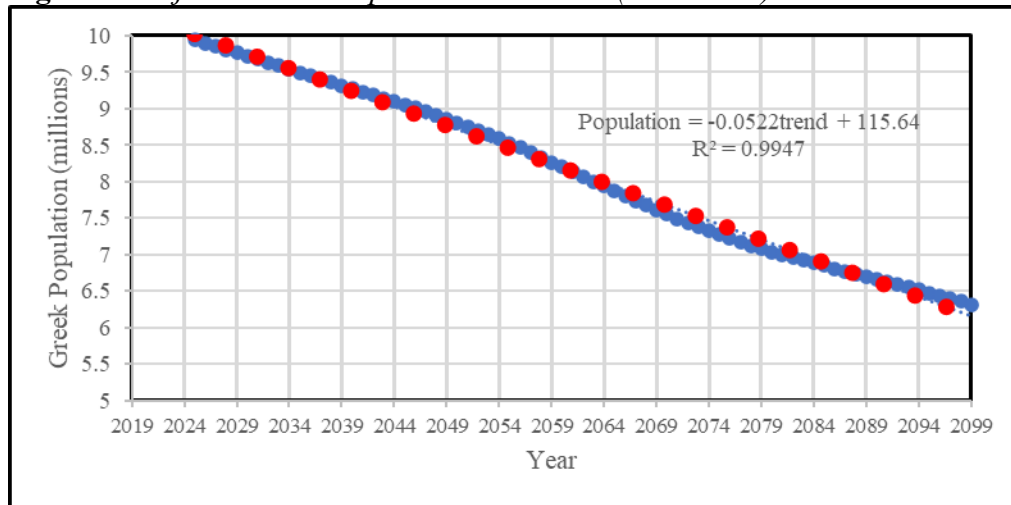
Variable	Level	1 st Difference	2 nd Difference
Per Capita GDP	Rejected	Failed to reject (Prob.=0.001)	NA
Population	Rejected	Rejected	Failed to reject (Prob. = 0.0033)

Note: The test was performed using all possible combinations of a constant, a trend, and no deterministic components. The results regarding rejection or failure to reject the null hypothesis were the same in all cases.

The two variables are not integrated of the same order. Per capita GDP is integrated of order one ($I(1)$), while population is integrated of order two ($I(2)$). Therefore, we conclude that no standard cointegration relationship exists between them, as they differ in their orders of integration. Consequently, there is no meaningful long-run relationship between the two variables.

Greece's Population: The Next 75 Years (2025-2099)

Figure 3 presents the scenario analysis conducted by the United Nations for the Greek population over the next 75 years. Starting from a population of 10 million in 2024, Greece is projected to decline to 6.3 million by 2099. This projection follows a linear trend, as illustrated in the graph. By extending this trend, we estimate that the population would reach zero around the year 2215, approximately 190 years from now.

Figure 3. *Projected Greek Population in Millions (2025–2099)*

Source: United Nations (<https://population.un.org/wpp/Download/>)

The problem with assuming linearity is that, while it may serve as a reasonable approximation over a short period, it generally fails to capture long-term trends, especially those extending beyond 100 years.

It is important to distinguish between planned and unplanned events. By planned events, I refer to proactive policies that Greek public authorities can implement. Unplanned events, on the other hand, typically trigger reactive policy responses. For example, the mass influx of Asia Minor Greeks in the early 1920s due to war was an unplanned event. However, the Greek government at that time adopted a series of reactive policies to address the needs of these refugees.

More recently, the influx of migrants from Ukraine following the Russian invasion in 2022 led to the implementation of effective reactive policies by the Greek government, as discussed in Papanikos (2022a). Komušanac (2024) also examined the forced migration of the Ukrainian population caused by the war.

Accepting refugees and migrants—whether through planned or unplanned processes—can serve as an effective short-term solution to population shortages. It is one of many policy options available to governments for addressing demographic challenges in the short, medium, and long term. These policies, aimed at reversing the concerning trend of declining Greek population growth, are discussed in the next section of this paper.

Short-Term Policies to Increase Greece's Population

Will Greeks fade away, and what can be done about it? In the good old days, more than 2,500 years ago, when Greeks faced a problem, they consulted various oracles, the most famous being the Oracle of Delphi. For example, when asked who the wisest man on earth was, the Oracle named Socrates. It is now well known that Socrates interpreted this by saying the reason was that he knew that he knew nothing, while others believed they knew, if not everything, at least many things.

What Does the AI Say?

In the modern world, when we face a problem, we ask Artificial Intelligence. So, I did. Its answer is provided in Box 1.

Box 1. What Are the Best Policies to Increase the Population?**ChatGPT said:**

Increasing population growth, especially in countries facing demographic decline, requires a combination of economic, social, and policy incentives. Here are some of the best policies that have been effective in different parts of the world:

1. Financial Incentives & Family Support

- **Direct Cash Payments:** Countries like Hungary and Poland offer financial incentives to families with multiple children.
- **Tax Benefits:** France provides generous tax breaks for families with children.
- **Free or Subsidized Childcare:** Nordic countries like Sweden and Norway make high-quality childcare affordable.
- **Parental Leave:** Countries with extended paid maternity/paternity leave (e.g., Estonia, Sweden) see higher birth rates.

2. Work-Life Balance

- **Flexible Work Hours:** Encouraging remote work or shorter workweeks helps parents balance careers and families.
- **Job Security for Parents:** Strong labor protections for parents prevent career setbacks after childbirth.

3. Housing & Urban Planning

- **Affordable Housing Programs:** Policies that reduce housing costs (e.g., grants, subsidies, low-interest mortgages) can encourage young couples to start families.
- **Family-Friendly Cities:** Designing urban spaces with parks, schools, and safety in mind improves quality of life for families.

4. Immigration & Integration Policies

- **Pro-Immigration Policies:** Countries like Canada and Australia offset low birth rates by attracting young immigrants.
- **Integration Support:** Language training, employment assistance, and social inclusion efforts help immigrants contribute to population growth.

5. Cultural & Social Support

- **Changing Social Norms:** Encouraging a more family-friendly culture through media, education, and employer policies.
- **Reducing Gender Inequality:** Countries with strong gender equality (e.g., Scandinavia) see higher fertility rates due to shared parenting responsibilities.

Source: ChatGPT (Asked 12 April 2025).

The Performance of Countries Mentioned by AI

AI is a tool, and researchers should use it with caution. Figure 4 and Table 4 show the populations of the eight countries mentioned by AI for both the past and the next 75 years. According to UN projections, half of these countries (Estonia, Hungary, Norway, and Poland) are expected to experience population decline over the next 75 years. Therefore, their policies may not serve as good models. Two countries (France and Sweden) are projected to maintain stable populations, while only two countries (Australia and Canada) are expected to see population growth

during this period. This growth is primarily attributed to their effective policies of attracting migrants from around the world. Migration policies, therefore, represent the most effective short-term strategy to positively impact the Greek population. This aspect of population policy is examined further in the remainder of this section.

Policy Implications for Greece

What I propose here are short-run policies aimed at increasing Greece's population at the lowest possible transaction cost. I define the short run as a period of less than five years. I also assume that the most effective, efficient, competitive, and democratic way to achieve this goal is by attracting young people to Greece—an approach successfully implemented by countries such as Australia and Canada. Migration is a complex and sensitive issue, and it requires a democratic framework, as defined in a series of my previous studies (see Papanikos 2020b, 2022a, 2022b, 2022c).

The key challenge lies in selecting migrants, as not all migrants are the same. Greek public authorities should invite and encourage those migrants who impose the lowest transaction costs in terms of social, political, and cultural integration.

These costs can be minimized by applying Herodotus's criteria of identity to prospective migrants. This framework can be further enhanced by incorporating Isocrates's criterion. I have explained these criteria in detail elsewhere (Papanikos, 2024a); here, I refer to them as tools for reducing the costs associated with integrating new people into Greek society.

Figure 4. *Population in Selected Countries in Millions (1950-2100)*

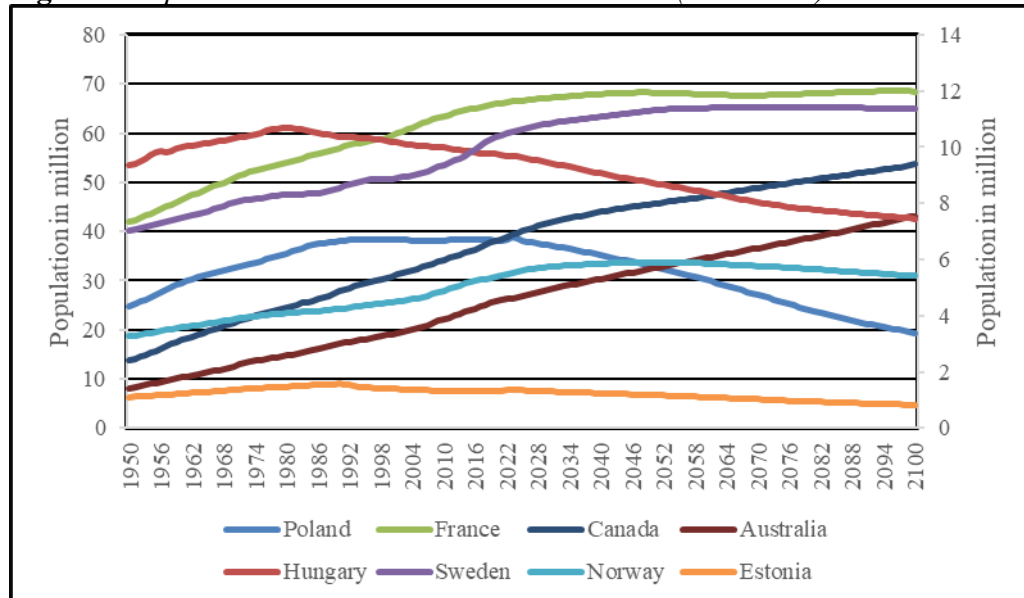


Table 4. *Countries Classified According to their Population Trends*

Country	Population Trend
Australia	Increasing
Canada	Increasing
Estonia	Decreasing
France	Stable
Hungary	Decreasing
Norway	Decreasing
Poland	Decreasing
Sweden	Stable

I provide a brief discussion of how these criteria, as applied to Greece, help minimize the transaction costs of migration. Language is always an obstacle. Learning a new language requires both time and money, and migrants often never fully master it in a way that does not “betray” their status as outsiders attempting to integrate fully into society. Since English has become a de facto official language, migrants who already speak English should be preferred.

Religion is also important in Greece. Being Greek Orthodox minimizes the transaction costs associated with meeting the spiritual and religious needs of new migrants. Greece is full of Greek Orthodox churches, most of which are underutilized and fail to benefit from economies of scale. Unfortunately, these churches cannot take advantage of economies of scope, which would be possible if they could simultaneously serve followers of other religions. The cost of building and operating a church in Greece is substantial and is typically borne by the Greek state. I should emphasize again that my approach here is strictly economic—specifically, minimizing the cost of accepting new migrants—and not based on any value judgment. *Ceteris paribus*, if I had to choose between Greek Orthodox and Muslim migrants, I would prefer the former. Apart from minimizing economic costs, this might also reduce the social and political costs associated with the coexistence of different religions.

Table 5. *Five Migrant Selection Criteria from Herodotus and Isocrates*

	Proposed by	Criterion	Applying to Greece
1	Herodotus	Language	Greek/English
2	Herodotus	Religion	Greek Orthodox
3	Herodotus	Blood	Greek Descent
4	Herodotus	Way of life/Culture	South European & Eastern Mediterranean
5	Isocrates	Education	Talents/Skills/Manual

The most obvious criterion is ancestry. This is a very important factor, as many people around the world have Greek ancestry. These individuals are likely to adapt more quickly, as Greece is, in a sense, “in their blood.”

Finally, Herodotus emphasized the importance of a shared way of life—what we today refer to as culture. Migrants can remain diverse and retain their own ways of life, but if there are similarities with the Greek way of life, the transaction costs of settling are reduced. Cultural diversity enriches societies, as is evident in Greece

itself, where every region has its own customs—expressed in traditional dress, local dialects, songs, dances, cuisine, and more.

The fifth criterion was proposed by Isocrates, who defined "Greekness" as encompassing all those who had received an education. In those days, very few people were educated, and all others—those without education—were considered "barbarians."

Today, this approach would translate into selecting migrants based on whether they possess the education and skills demanded by the Greek labor market. This could also include unskilled labor, such as individuals willing to work as farm workers or in the thriving Greek tourism sector.

Table 6 provides a short-run plan to increase migrant inflow over the next five years. Age and family status will be the most important criteria. The ideal migrant would be under the age of 50 and accompanied by a family with young children.

Each policy category (A to F) requires a distinct set of measures to attract members of the six target groups. Expatriates are no longer a homogeneous group as they were in the 1950s and 1960s. Today, they range from manual laborers to world-renowned scientists with impressive academic and research careers.

Greece faces challenges in attracting these highly skilled expatriates, particularly because the academic and research sectors are already saturated. Moreover, in the modern globalized world, scientists often transcend national boundaries—they collaborate with peers worldwide instantly and seamlessly. Unfortunately, this highly visible group tends to receive disproportionate media attention.

Table 6. *Short-Run Policies to Increase Greece's Population through New Migration (Five-Year Plan).*

Policies	Target Group	Number
A	Expatriates born in Greece	50,000
B	First-Generation Greek Migrants (defined as individuals with at least one parent born in Greece)	20,000
C	Second Generation or Beyond	10,000
D	Religion-Related New Migrants	20,000
E	Culturally Related New Migrants	10,000
F	Labor Market-Driven Migrants	40,000
Total		150,000

What is truly needed is a comprehensive census of all Greeks living and working abroad who would be willing to return under specific conditions. Policies should be tailored to individuals' unique circumstances. To support this effort, a dedicated government office should be established with the sole mission of facilitating the return of Greeks to their homeland. The issue of return migration has been examined by González Rosas and Zárate Gutiérrez (2018) in the context of Mexico.

Policies B and C target potential migrants to Greece who meet Herodotus' criterion of having the "same blood." Unfortunately, Greece does not maintain census data on how many people of Greek ancestry live around the world. The country has a long history of migration, particularly in regions such as Asia Minor, the Caspian Sea area, and Southern Italy (Magna Graecia). Millions of people in these areas are of Greek descent.

Of course, while this heritage may serve as a useful marketing tool, it is unrealistic to suggest that migration policy can explicitly target such broad and geographically dispersed groups. More recently, since the 19th century, many Greeks have migrated and settled in countries around the world.

What is needed now is, first, to identify and register individuals of Greek ancestry abroad, and second, to approach them as a potential pool of new migrants.

Greek Orthodox individuals around the world might be more inclined to migrate to Greece if they face restrictions in their home countries. A recent example is the Ukrainians who came to Greece following the Russian invasion.³ Similarly, in many countries, the Greek Orthodox Church is under threat, such as in Syria and several other Muslim-majority nations. Greek public authorities could use these circumstances as an opportunity to welcome these individuals to Greece. Although this may not be the primary objective, it would nevertheless contribute to an increase in the Greek population.

The fifth category is also of interest because Herodotus believed that Greeks have a distinct way of life. However, this way of life is characteristic of many people living in Southern Europe and the Eastern Mediterranean. Among these groups, I would like to focus in particular on the Turkish people, especially those living in Asia Minor. Many of them are of Greek descent, as the Ottoman Empire followed a systematic policy of Islamization and Turkification of its non-Muslim citizens for centuries. One could argue that these people satisfy Herodotus's criterion of having "the same blood." Regardless of whether this is true, they share many cultural values with the Greek people. It is no coincidence that many Turkish citizens have taken advantage of Greece's Golden Visa policy and purchased property in the country. After the Chinese, Turkish citizens rank second in the number of Golden Visa holders.

The last category is the most important one. Greece primarily needs manual workers to meet the excess demand in the tourism and agricultural sectors. This presents a great opportunity to select workers from around the world to come to Greece on five-year contracts with their families and children. At the end of this period, these migrants would have the option to apply for permanent residency, which could eventually lead to Greek citizenship.

This approach contrasts with the current situation, where most migrants arrive alone—primarily men—with little incentive to integrate into Greek society. However, if they come with their young children, receive various forms of welfare assistance, and attend Greek schools, these families would have a much greater potential to integrate successfully into Greek society.

The six target groups mentioned above are not mutually exclusive, and an individual may belong to more than one group. It is up to policymakers to design a five-year plan to bring in 150,000 new migrants over the next five years. Incentives should be shaped by the actual needs and preferences of the people and offered *ex post*, rather than being announced in advance and awaiting reactions. An individualized, person-centered approach is essential.

To summarize the above analysis, it should be noted that it falls under the broader theme of migration adjustment and the potential costs it may impose on the

³I have examined the Russian invasion of Ukraine from multiple perspectives, including the issue of migration (see Papanikos 2022d, 2022e, 2022f, 2022g, 2022h, and 2024b).

host country. Various aspects of this issue have been examined in numerous studies, including those by Arnon and Shamai (2016), Avgoulas and Fanany (2021), Duca (2014), Lee and Weng (2019), Lorenza Rimoldi and Barbiano Di Belgiojoso (2016), Maddaloni (2023), Mendoza (2016), Nath et al. (2022), Reddy Edara I (2020), Salin et al. (2023), Salin et al. (2024), Tseligka (2022), and Stephenson and Moayerian (2025).

Conclusions

The answer to the question posed in this paper—“Is Greece dying?”—can be addressed simply by stating that it is a possibility. However, if the right policies are adopted, Greece’s population has the potential not only to stabilize but also to increase. Countries such as Israel, and more recently Germany, have achieved population growth by implementing appropriate policies to reverse aging and shrinking (Fuchs, 2015).

In this paper, I proposed that policies should vary depending on the target group. I examined only policies aimed at increasing migration to Greece, as this has an immediate positive effect on population. I used five criteria derived from Herodotus and Isocrates to define six target groups. Greek policymakers should design tailored policies to attract migrants from each group, based on data collected about the potential size of each.

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