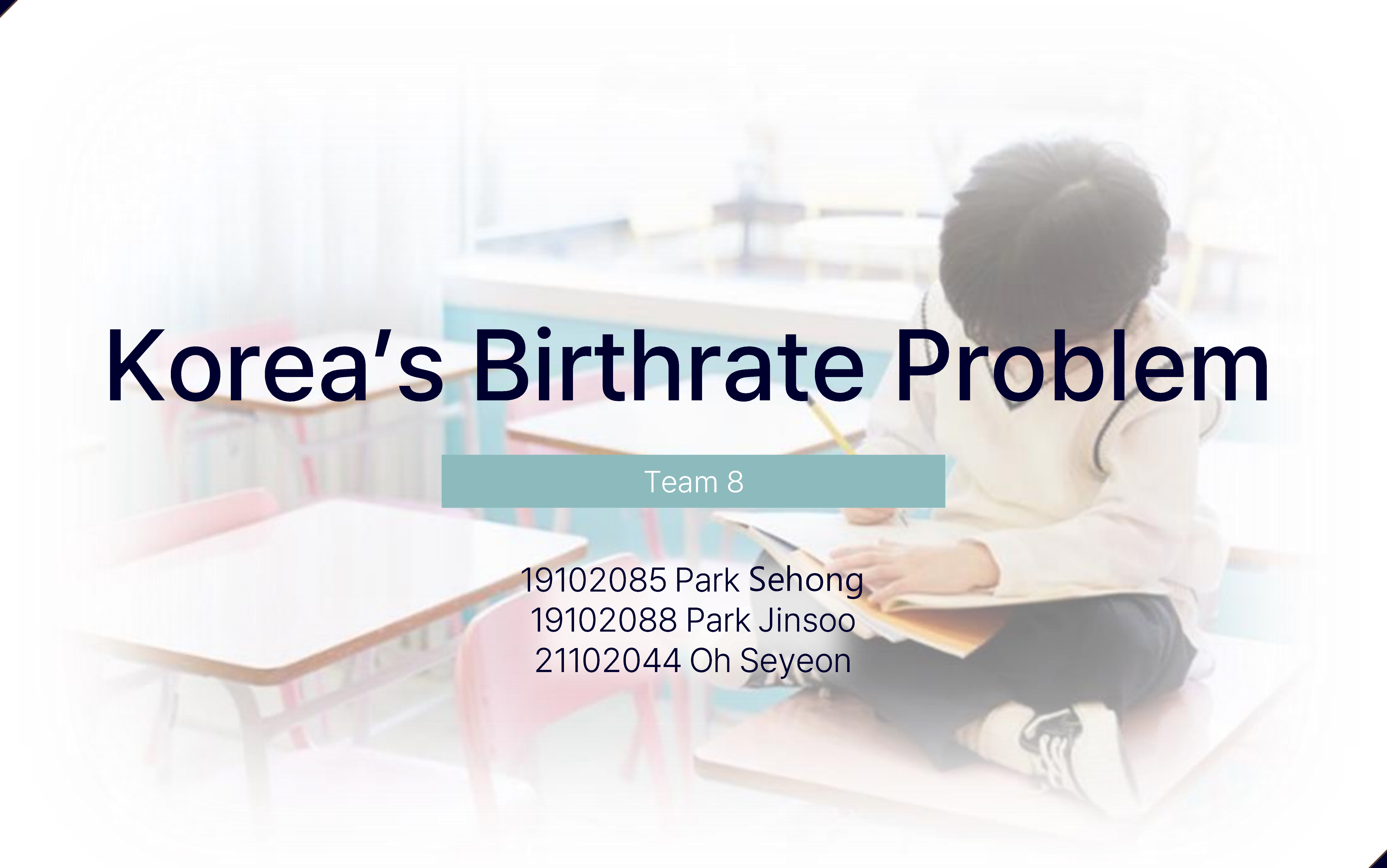

Korea’s Birthrate Problem

Team 8

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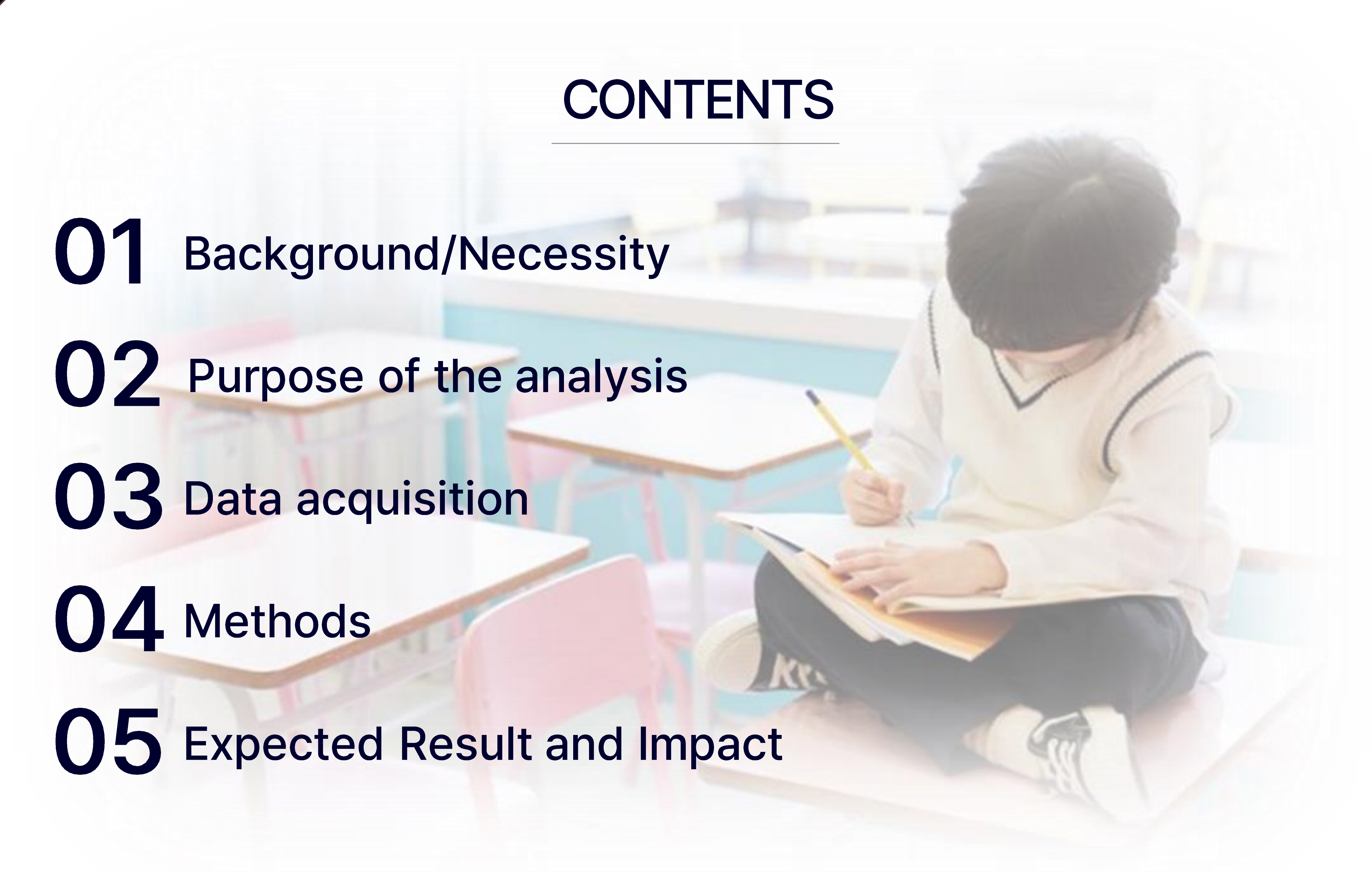
CONTENTS



01 Background/Necessity

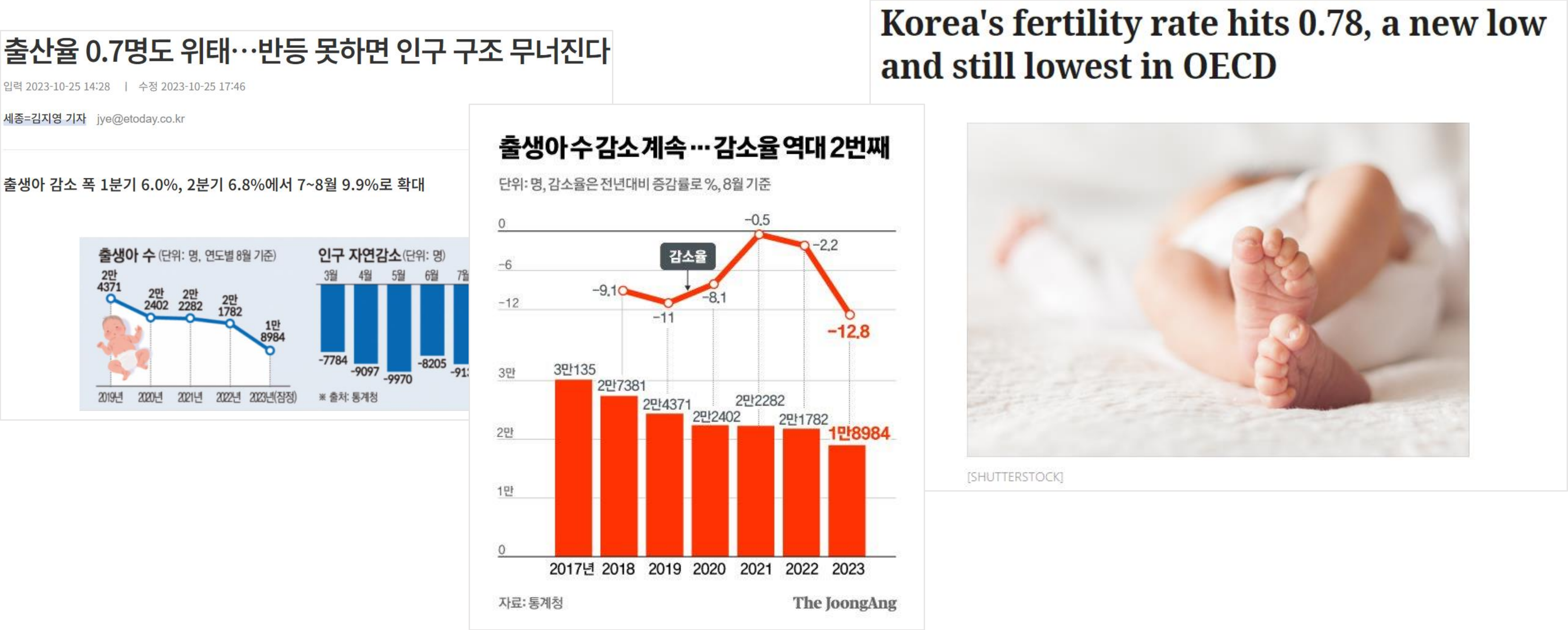
02 Purpose of the analysis

03 Data acquisition

04 Methods

05 Expected Result and Impact

Background/Necessity



출산율 0.7명도 위태…반등 못하면 인구 구조 무너진다

입력 2023-10-25 14:28 | 수정 2023-10-25 17:46

세종=김지영 기자 jye@etoday.co.kr

출생아 감소 폭 1분기 6.0%, 2분기 6.8%에서 7~8월 9.9%로 확대

출생아 수 (단위: 명, 연도별 8월 기준)
2만 4371
2만 2402
2만 2282
2만 1782
1만 8984
2019년
2020년
2021년
2022년
2023년(잠정)
인구 자연감소(단위: 명)
3월
4월
5월
6월
7월
-7784
-9097
-9970
-8205
※ 출처: 통계청

출생아 수 감소 계속…감소율 역대 2번째

단위: 명, 감소율은 전년대비 증감률로 %, 8월 기준

0
-6
-12
감소율
-9.1
-11
-8.1
-0.5
-2.2
-12.8
3만
2만
1만
0
3만135
2만7381
2만4371
2만2402
2만2282
2만1782
1만8984
2017년
2018
2019
2020
2021
2022
2023

자료: 통계청

The JoongAng

Korea's fertility rate hits 0.78, a new low and still lowest in OECD

[SHUTTERSTOCK]

Background/Necessity

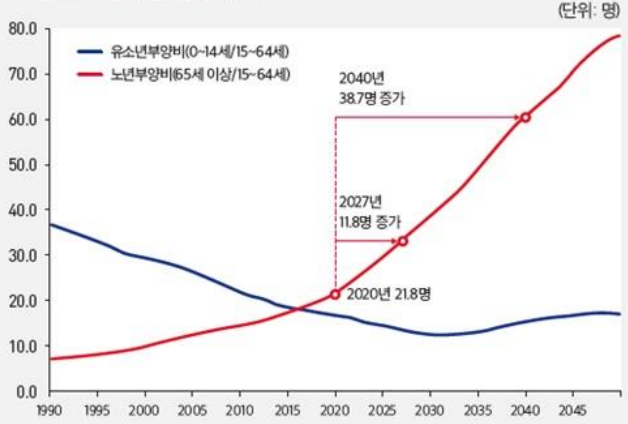
- **What are the risks of decreasing the birth rate in Korea?**

  - Demographic Challenges: A declining birth rate leads to demographic challenges due to its rapidly aging population and shrinking workforce.

  - Economic Impact: A low birth rate can lead to a reduced consumer base, decreased demand for goods and services, and potential stagnation in economic growth.

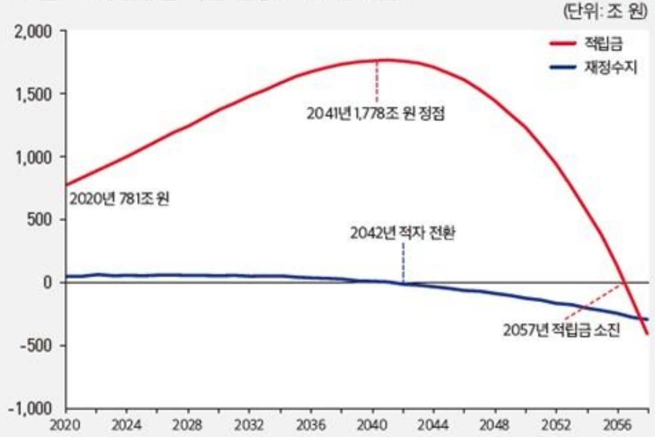
  - National Defense Concerns: A reduced younger population might pose challenges in terms of military recruitment and national defense capabilities.

〈그림 1〉 부양부담 변화 추이



자료: 통계청

〈그림 2〉 국민연금 재원 전망(2018년 기준)



자료: 보건복지부

Background/Necessity

- **What are the reasons for decreasing the birth rate in Korea?**
  - Economic Pressures: Rising living and housing costs, unstable job market.
  - Demanding Work Culture: Long working hours and prioritization of job over personal life.
  - Educational Pressure: High investment in children's education and extracurricular activities.
  - Limited Childcare & Parental Leave: Gaps in accessibility and quality.
  - Delay in Marriage: Increase in the average age of first marriage.
  - Housing Challenges: High cost and limited availability in urban areas.

⋮

There are so many reasons !!

Purpose of Analysis

1. Identifying the Primary Causes for the Decline in Birth Rates
   - Focusing on numerous factors, particularly from a socio-economic perspective.

2. Apply data analysis to explore **relationships and** correlations between socio-economic variables and birth rates.

3. Construction of a birth rate prediction model using derived variables

↓

Make recommendations for policies or strategies that could potentially reverse the decline in birth rates.

Data Acquisition

- **Introducing data to use :** We have categorized our data into several sections. This classification was inspired by the "2020 Humanities and Social Forum" which identified five major socio-economic factors influencing birth rates. Our aim was to comprehensively analyze the multifaceted factors affecting childbirth.

1) Population and birth rate data:

- Total birth rate in year (The World Bank)

2) Family and marital data:

- Mean age of women at childbirth (OECD)
- Average age at marriage (Our World in Data)
- Mean age at first marriage (The World Bank)

3) Data related to women:

- Labor force participation rate (The World Bank)

Data Acquisition

4) Work and employment data:

- Average annual hours worked (OECD)
- Employment status (OECD)
- Unemployment rate by age group (OECD)
- Employment rate by age group (OECD)
- Part-time employment rate (OECD)

6) Housing-related data:

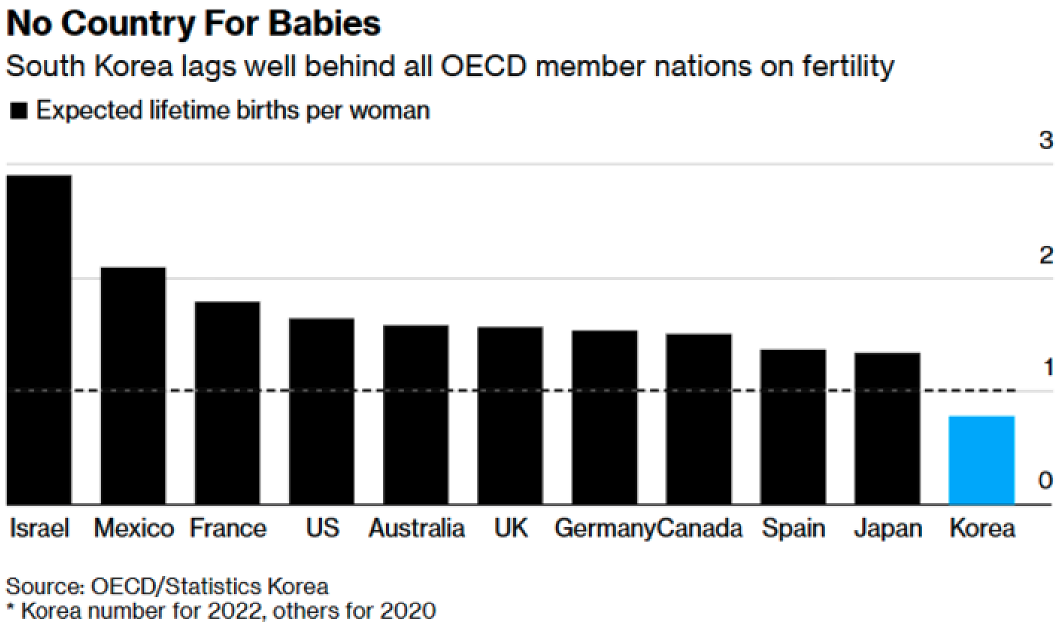
- Housing prices (OECD)
- Short-term interest rates (OECD)

5) Economic and financial data:

- Current health public expenditure (The World Bank)
- Family benefits public spending (OECD)
- Public spending on labor markets (OECD)
- Gross national income – GNI (OECD)
- Gender Development Index - GDI (Our World in Data)
- Gross domestic product – GDP (OECD)
- Part-time employment rate (OECD)

Data Acquisition

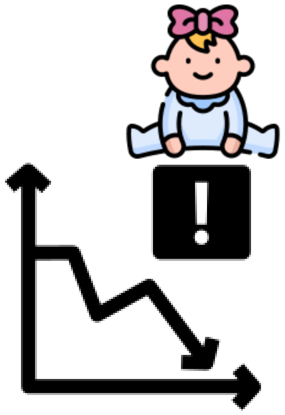
- Countries



No Country For Babies

South Korea lags well behind all OECD member nations on fertility

Source: OECD/Statistics Korea
* Korea number for 2022, others for 2020



Low Birth rate Countries in OECD

1. Korea
2. Japan
3. Spain
4. Canada
5. Germany

And more...

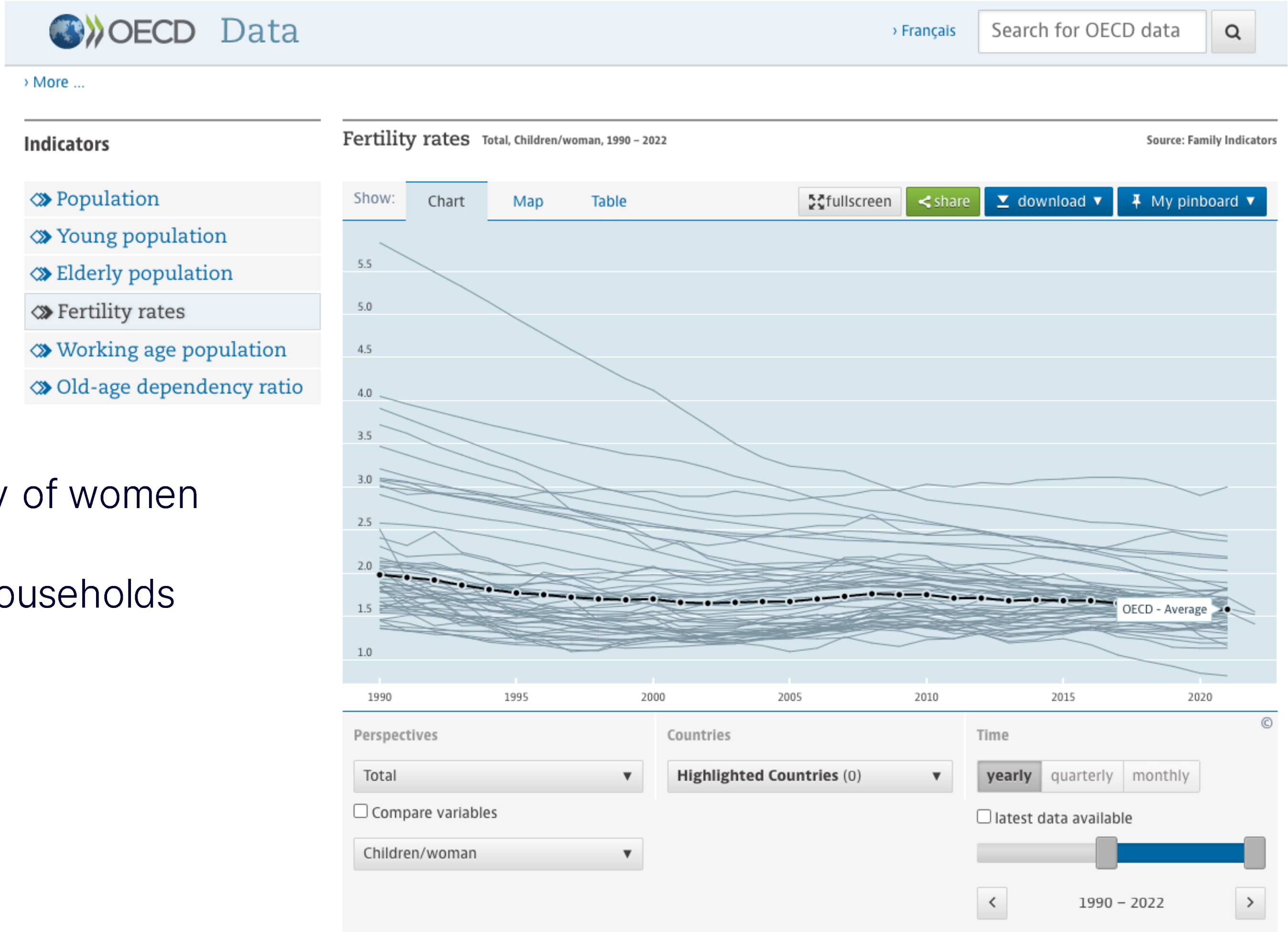
Data Acquisition

- Data Collection Period

1990 ~ 2023

- Why?

- Increased economic activity of women
- Increase in single-person households
- Economic hardship
- Rising house prices


OECD Data
› Français
Search for OECD data
› More ...
Indicators
Population
Young population
Elderly population
Fertility rates
Working age population
Old-age dependency ratio
Show:
Chart
Map
Table
fullscreen
share
download
My pinboard
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
1990
1995
2000
2005
2010
2015
2020
OECD - Average
©
Compare variables
latest data available
quarterly
monthly

Fertility rates Total, Children/woman, 1990 – 2022

Source: Family Indicators

Perspectives: Total

Children/woman

Countries: Highlighted Countries (0)

Time: yearly

1990 – 2022

Methods

- **Correlation analysis**
  - Pearson Correlation Coefficient : Useful when showing linear associations between variables. It is easy to interpret and intuitive.
  - Time Lagged Cross Correlation (TLCC) : Since the birth rate is time series data, we also want to use the method used to correlate time series data

↓

Remove features that correlate lowly with birth rates (reduce computing power & memory)

- **Feature Selection**
  - Filter Methods : compare the suitability of correlation analysis with Feature Selection to assess its significance.

Methods

- **Prediction Models**
  - Polynomial Regression : A form of linear regression, a regression technique that uses polynomials to model data in a curved form.
  - XGBoost : A type of gradient boosting algorithm, a machine learning algorithm used to model and predict data with a tree-based ensemble model.
  - ARIMA (AutoRegressive Integrated Moving Average) : The ARIMA model is useful for predicting or analyzing data considering trends, seasonality, and autocorrelation in time series data.

"Train multiple models and Choose best model"

Expected Result / Impact

1. Through a comprehensive analysis of socio-economic factors and data exploration, identify the primary causes contributing to the decline in birth rates.
2. By using derived variables and data analysis, a birth rate prediction model that provides insights into the future trends will be developed.
3. Provide recommendations for policies or strategies that could potentially reverse the decline in birth rates.

↓

By finding the most influential features and focusing on them,
we might figure out the "South Korea's low birthrate problem".

- References

- KDI: https://eiec.kdi.re.kr/publish/columnView.do?cidx=13981&sel_year=2022&sel_month=09#:~:text=%EC%A6%89%20%EC%A0%80%EC%B6%9C%EC%82%B0%EC%9D%80%20%EB%8B%A8%EC%9D%BC%EB%AC%B8%EC%A0%9C,%EC%9A%94%EC%9D%B8%EC%97%90%20%EC%A7%81%EB%A9%B4%ED%95%B4%20%EC%9E%88%EB%8B%A4

- OECD Data: https://data.oecd.org/

- Our World in Data: https://ourworldindata.org/grapher/gender-development-index?tab=table

- World Bank Open Data: https://data.worldbank.org/

- KOSIS: https://kosis.kr/statHtml/statHtml.do?orgId=101&tblId=DT_1ES4F13S&conn_path=I2

- OECD Stat: https://stats.oecd.org/

Q & A

Thank you