NHIS GLOBAL FORUM 2025

Big Data-Driven Evidence-Based Policymaking in the Korean Context

: Characteristics and Cases

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The Role of Data in Modern Policymaking

- **Healthcare policymaking lies at the intersection of scientific evidence and societal values.**
- **In the era of uncertainty (pandemics, aging, cost escalation), data has become a critical asset.**

- **Evidence-Based Policymaking (EBPM) ensures that policies are not only ideologically sound but empirically grounded.**
- **Korea offers a unique national context with institutional readiness and data maturity to implement EBPM at scale.**

Purpose and Scope of Presentation

- **Objective :**

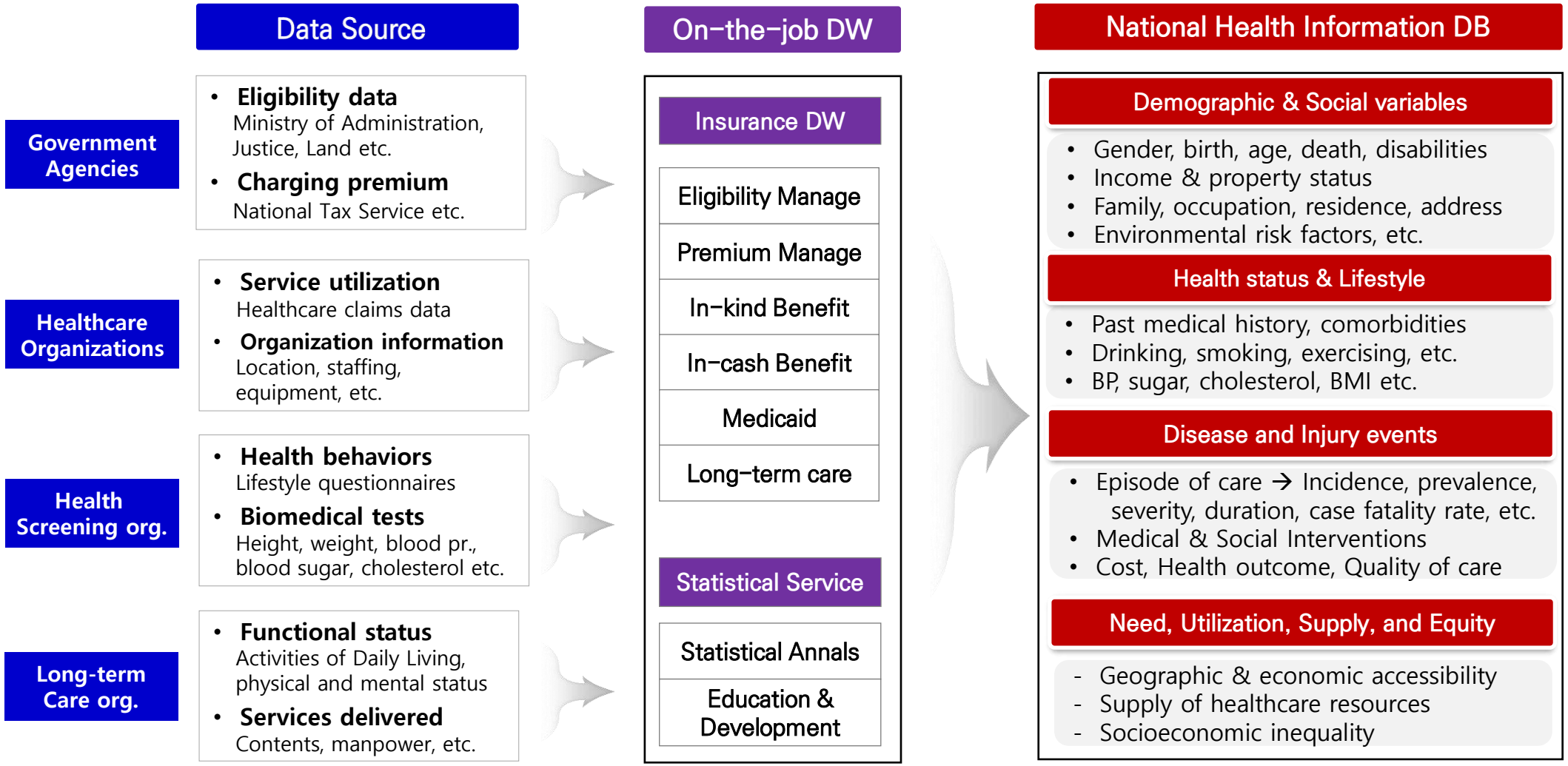
  To share how the Korean National Health Insurance Service (NHIS) leverages big data to guide national healthcare policy

- **Key points :**
  - ✓ **Overview of Korea's health data infrastructure**
  - ✓ **Characteristics of EBPM in the Korean context**
  - ✓ **Case 1: COVID-19 Policy using Big Data**
  - ✓ **Case 2: Overuse Due to Private Insurance**
  - ✓ **Case 3: Development of Regional Medical Map**
  - ✓ **Lessons learned and global implications**

Korea's National Health Data Infrastructure

- **Single-payer National Health Insurance (NHI) system, covering the entire population** (approx. 52 million people)
- **Nearly 100% electronic claims submission rate**
- **Detailed information based on the fee-for-service system** (ex: 2 tablets at a time, 3 times a day, for 5 days)
- **Nearly perfect follow up** (≥ 23 yrs.) **with daily time unit**
- **Health screening** (participation rate≒70%) **and Long-term care for the elderly are also included**
- **Socioeconomic variables** (Unique personal IDs, income, occupation, family, residential area, disability, etc.)

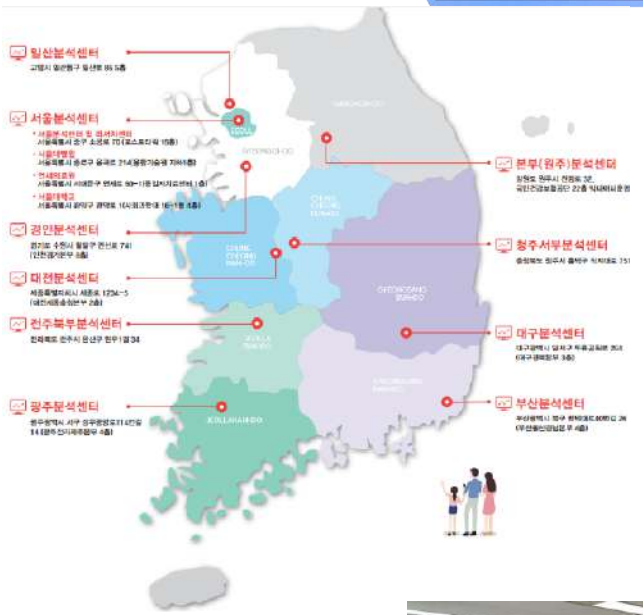
Korea's National Health Information DB (NHID)



Institutional and Legal Frameworks for Data Use

- **Legal basis :**

  - Statistics Act,
  - Personal Information Protection Act,
  - National Health Insurance Act.



- **Data governance:**

  - Centralized data custodianship by NHIS
  - Independent Data Review Boards(DRBs) & IRBs
  - Data pseudonymized in multiple stages
  - Over 1,200 research applications and approvals annually
  - Closed network analysis centers (14 centers with 313 seats)
  - Sample data for remote access

Core Features of the Korean EBPM Model

- **Full-population, longitudinal data → Enables causal inference, risk modeling, and predictive analytics.**
- **Real-time policy feedback → Data continuously informs policy design, revision, and evaluation.**
- **Conflict mediation → Scientific data helps resolve political or social debates by providing objective evidence**

Core Features of the Korean EBPM Model

- **Cross-agency collaboration**

Public

Ministry of Health and Welfare,
Ministry of Environment,
Ministry of Employment & Labour,
Ministry of Economy and Finance,
Ministry of Food & Drug Safety,
and many Local Governments

Korean Disease Control and Prevention Agency,
Korean Social Security Information Service,
Korea Institute for Health and Social Affairs,
National Evidence-based Healthcare Collaborating Agency,
National Medical Center, National Cancer Center,
National Tax Service, Statistics Korea, etcs.

Private

The Korean Societies for

Hypertension,
Diabetes,
Gastroenterology,
Tuberculosis and Respiratory Diseases,
Lung cancer,
Bone and Mineral Research, etcs.

and

Many researchers of

Epidemiology, Statistics, Economics,
Environment, Social welfare, etcs.

Our definition of the “NHID”

A strategic tool

for observing, identifying, and predicting the interactions between various factors (environment, disease, economy, institutions, occupation, family, drugs and treatments, etc.) and the health of our people from birth to death,

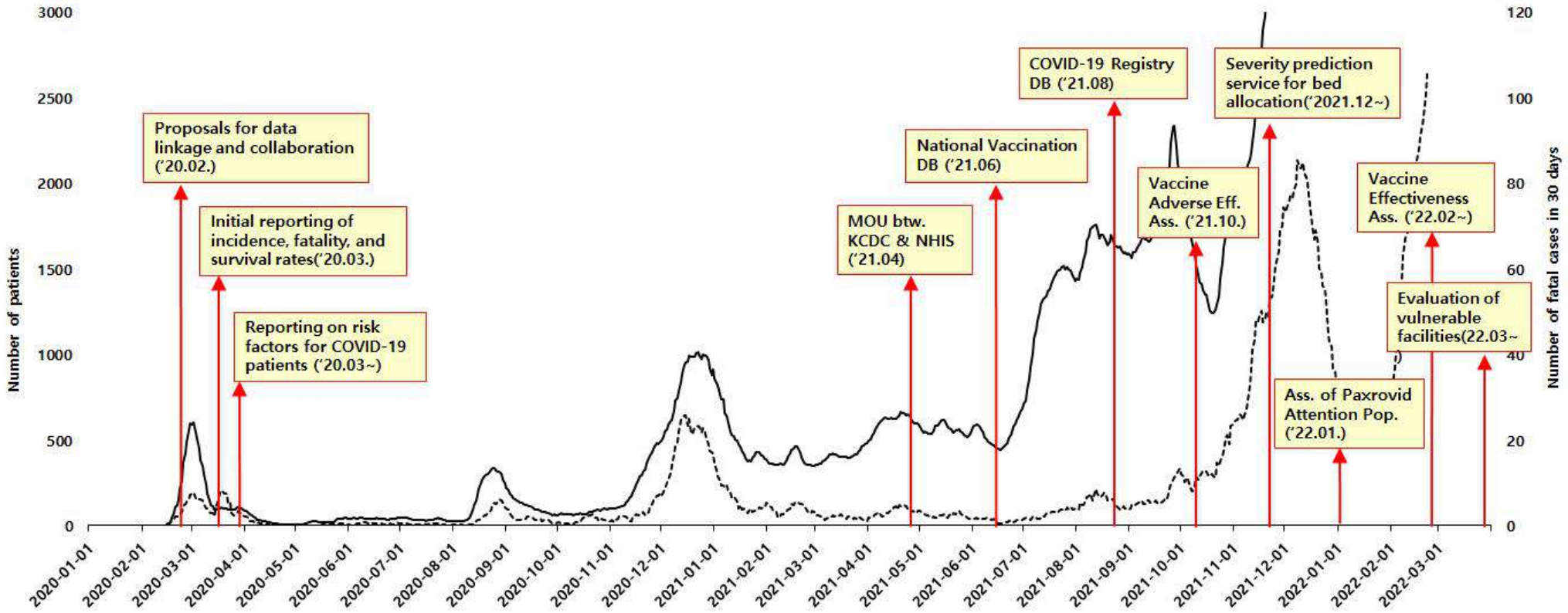
and

for producing scientific evidence to seek solutions.

우리나라 국민의 출생부터 사망까지 다양한 요인들(환경, 질병, 경제, 제도, 직업, 가족, 약물 및 치료 등...)과 건강 사이의 상호작용을 관찰-규명-예측하고 해법을 모색할 과학적 근거를 생산할 수 있는 전략적 도구

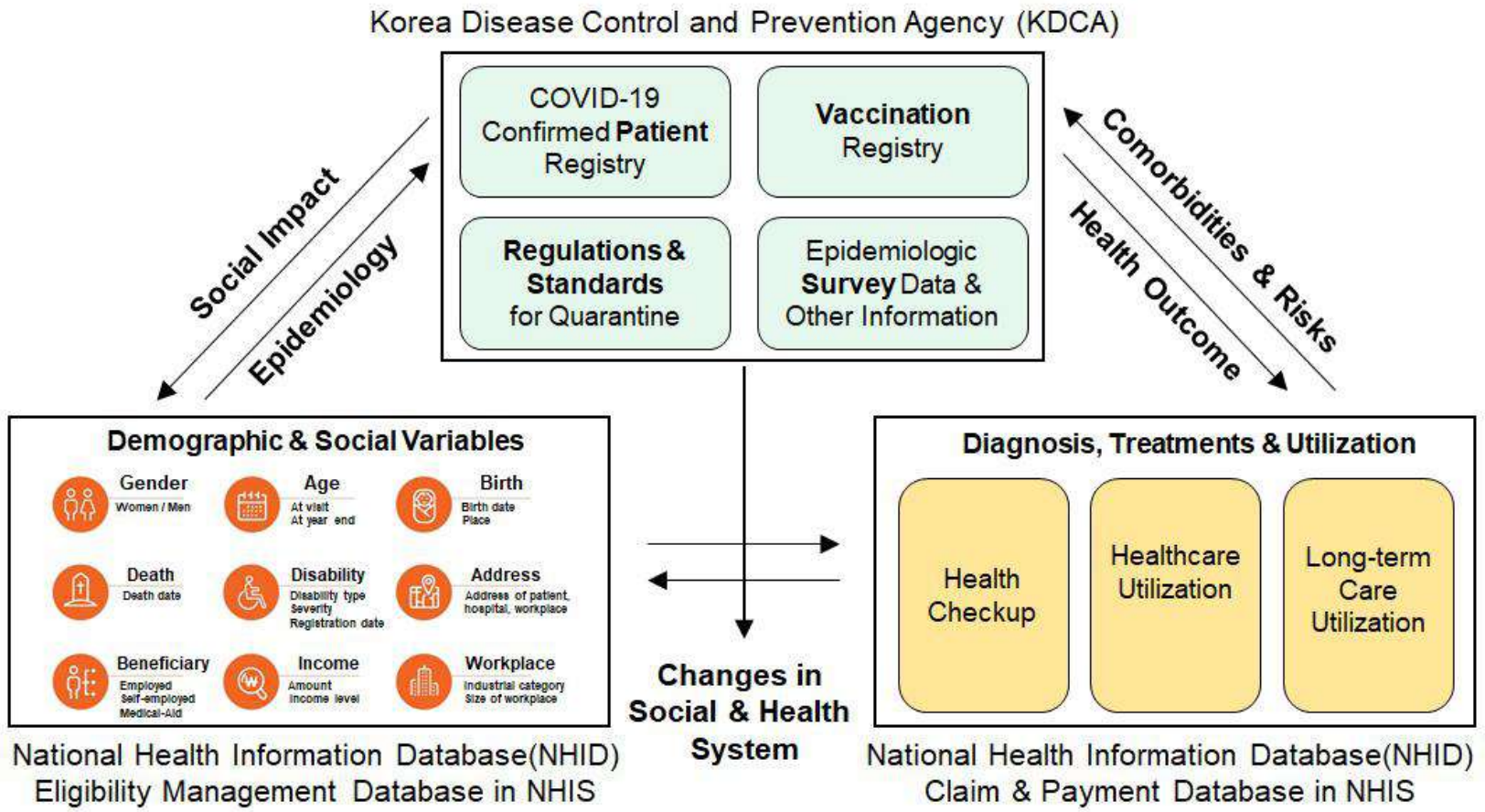
Case 1 : COVID-19 Policy using Big Data

- **Data sharing and collaboration between the KDCA(Korea Disease Control and Prevention Agency) and the NHIS began in February 2020, at the onset of the COVID-19 pandemic.**



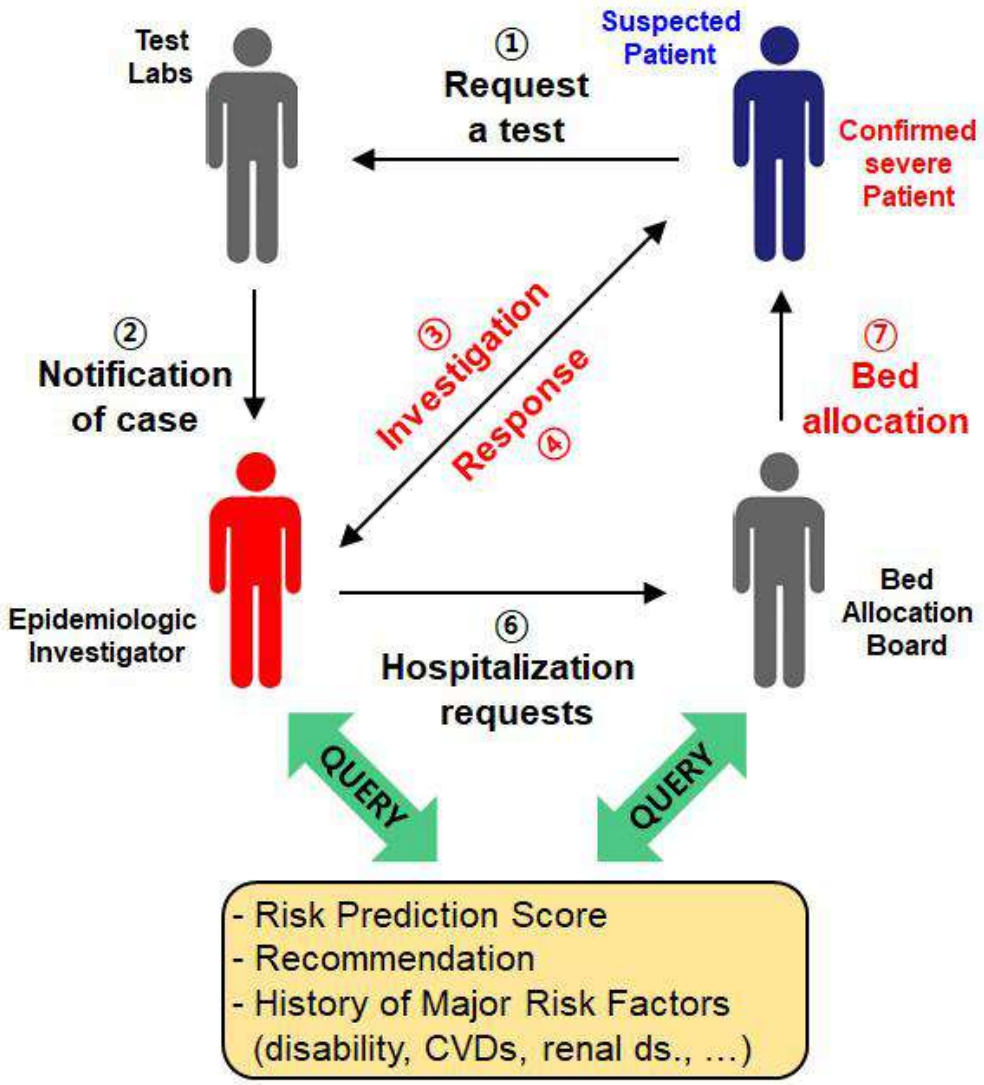
K-COV-N LINKAGE DATABASE

Korean Disease Control and Prevention Agency - COVID-19 - National Health Insurance Service



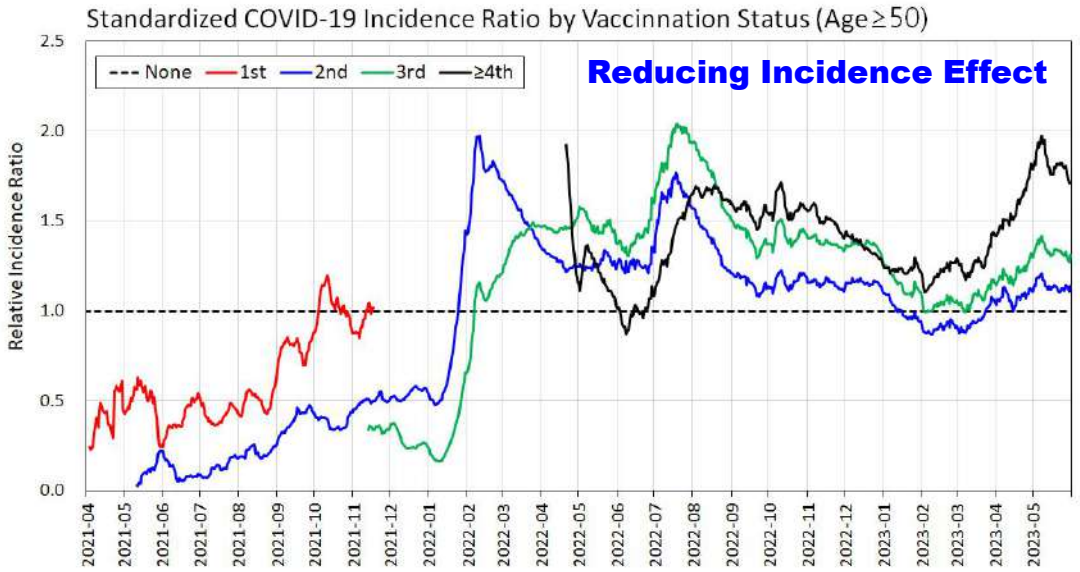
- ✓ **For the evidence-based quarantine policies**
- ✓ **Combining the KDCA and the NHIS data**
- ✓ **Open big data for academic and private researchers**
- ✓ **Versatile data enables interdisciplinary research**

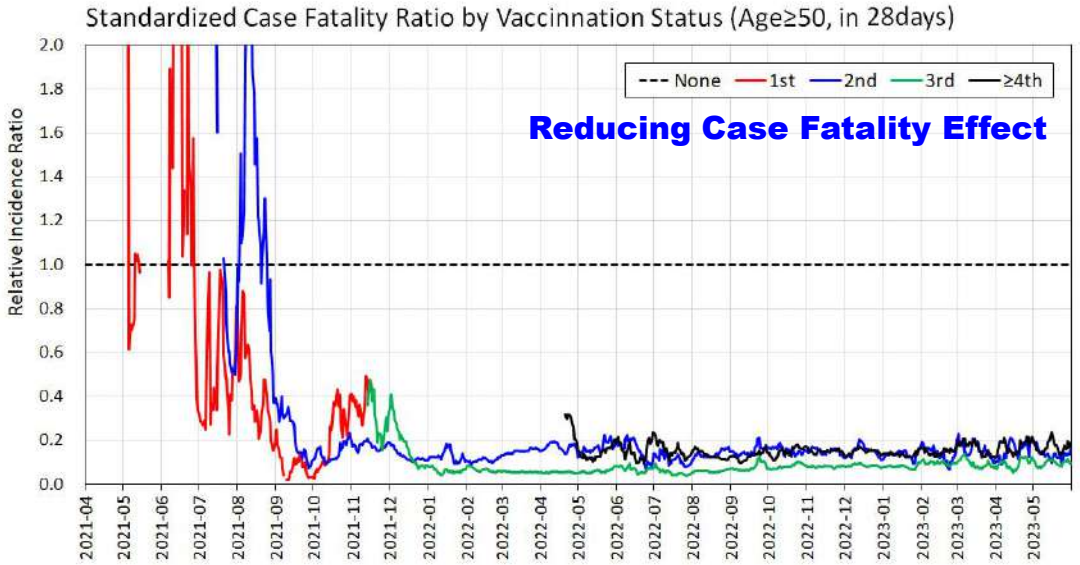
Risk Prediction Score Service for Patients



- ✓ **In late 2021, COVID-19 patient explosion**
  → **Bed shortages and system crisis**
- ✓ **Services that public agents can check a Patient's Risk Prediction Score and 8-item Medical History during a phone survey**
- ✓ **<u>Improved communication and minimized conflicts</u> between public agents & medical doctors**
- ✓ **17.2 million uses (98%) by June 10, 2022 (approved by the Privacy Commissioner)**

Population-based Vaccine Effectiveness Monitoring





- ✓ **<u>Daily-based</u> population, vaccination status, incidence, and death from the K-COV-N**
- ✓ **All vaccinations were effective against incidence for 3 to 5 months.(It is a natural course!)**
- ✓ **Case fatality rates remained from 0.1 to 0.2 times that of the unvaccinated population.**
- ✓ **So, we focused on the unvaccinated and high-risk population rather than the entire population.**

Case 2 : Overuse Due to Private Insurance

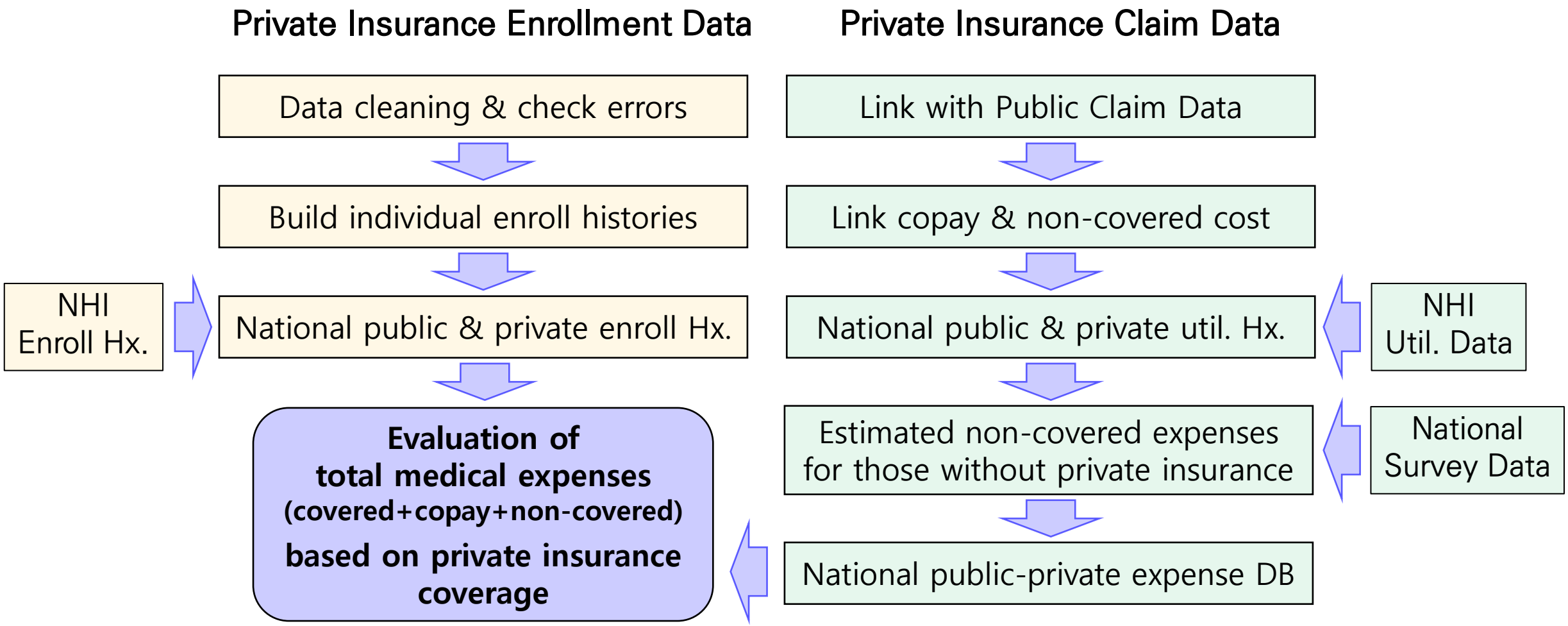
- **In South Korea, a special type of private health insurance (Sil-Son Bo-Heom) that compensates for copayments and non-covered medical expenses (supplementary+complementary).**

- **There have been concerns that the 'Sil-Son Bo-Heom'**

  - may contributes to excessive use and financial risk of the National Health Insurance by compensating for copayments,

  - and may have a negative impact on the essential medical systems by expanding the non-covered market.

Building National Total Medical Util. & Cost Data



Excess expenses caused by private insurance

- **Adjusted for gender-age, income level, past medical history, and current illness**
- **60% of private insurance subscribers do not file a claim even once a year**
- **The excess costs incurred by the National Health Insurance due to 'Sil-Son Bo-Heom' are estimated to be between a minimum of 2.78 billion dollars and a maximum of 7.91 billion dollars.**
- **The excess national medical expenses incurred due to 'Sil-Son Bo-Heom' are estimated to be between a minimum of 9.39 billion dollars and a maximum of 16.89 billion dollars.**

Impact of ‘Sil-Son Bo-Heom’ on healthcare system

- ‘Sil-Son Bo-Heom’ in-patients spend more than twice as much on non-covered expenses.
- ‘Sil-Son Bo-Heom’ out-patients spend more than 10 times as much on non-covered expenses.
- Regulations on private insurance benefits lead to cost shifting to public insurance.
- Doctors prefer medical specialties that are highly dependent on services not covered by public insurance.

→ Policy review is needed to address Korea's high level of non-covered services and reform the payment structure.

Case 3 : Development of Regional Medical Map

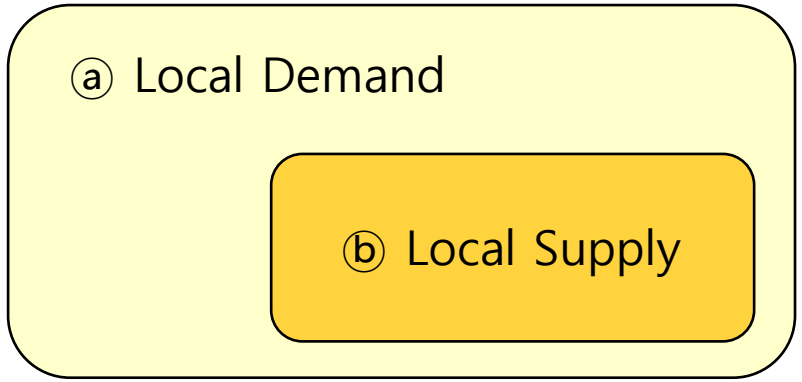
- **NHIS has the responsibility to operate an efficient health security system by providing high-quality medical services equitably to all citizens.**

- **Medical expenses are determined by a combination of patient, provider, and institutional factors.**

- **NHIS possesses a big data system capable of analyzing and monitoring patient factors (medical history, occupation, income, region, etc.), provider factors (manpower, beds, equipment, treatment patterns, etc.), institutional factors (various related programs and system operations), as well as health outcomes (mortality, hospitalization, screening results, etc.).**

Two perspectives on the regional medical map

Self-sufficiency Perspective



Relevance Index = ⓑ ÷ ⓐ

- Suitable for post-evaluation of regional completeness
- Ignores unmet needs
- Pursuit of completeness by all local governments leads to oversupply

Accessibility Perspective

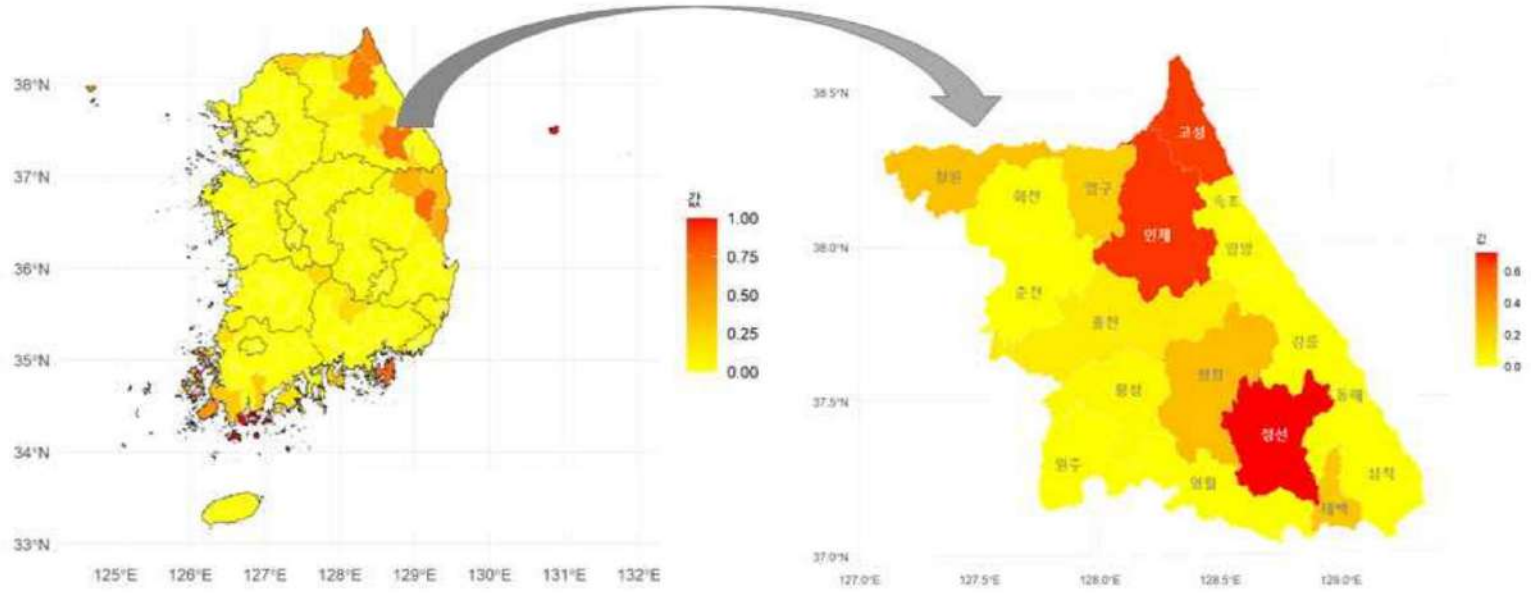
Accessibility Index = ⓓ ÷ ⓒ

- Aims to ensure minimum accessibility for all citizens
- Includes policy measures other than increasing hospital beds
- Predictable by population changes

Calculating accessible proportion of population

- **Utilize publicly available ‘route search service APIs’**
- **Calculate the shortest route and travel time between residents' homes and appropriate medical institutions**

Proportion(%) of population without access to emergency centers within 1 hour



District	%
Jung-sun	72%
In-je	66%
Go-sung	66%
Pyeong-chang	27%
Cheol-won	26%
Tae-baek	24%
Yang-gu	21%
Hong-cheon	10%
Hoeng-seong	5%
Young-wol	3%

Utility of Regional Medical Map for Accessibility

- **Selection of vulnerable areas in the government's ongoing regional medical reinforcement plan**
- **Prediction of the short-term effect of various policy options (personnel cost support, role sharing, improvement of transportation, public hospitals etc.)**
- **Mid- to long-term assessment of regional supply and demand and establishment of comprehensive local policies**
- **Link to long-term health outcomes and produce Real World Evidence of health policy options**

Cross-Cutting Lessons from All Cases

- **Timeliness** : Big data allowed policy and legal systems to adapt to emerging issues
- **Transparency** : Public confidence increased with data-driven evidence
- **Efficiency** : Evidence-based triage and resource allocation can save lives and resources
- **Scalability** : Demonstrated capacity to support clinical, health policy, and other regulatory decisions

Future Directions for Korean EBPM

- **Expand AI-based predictive analytics for chronic disease prevention**
- **Strengthen data linkage with private sector (e.g., insurers, EMR providers)**
- **Enhance public trust through improved data literacy and privacy protections**
- **Position Korea as a global leader in EBPM modeling and consulting**

Global Implications and Collaboration Opportunities

- **Many nations seek models for scalable, ethical, and effective EBPM**
- **Korea's integrated system and experience may offer a blueprint**
- **Areas for possible joint work :**
  - **Pandemic preparedness,**
  - **Aging population management,**
  - **Value-based healthcare system design, etc.**

Conclusions

- **Korea's experience shows that data is not just a resource**
  → it is infrastructure for trust.
- **When institutions, data, and public needs align,**
  → policy becomes more resilient.
- **We need to move from reactive policy**
  → to predictive, evidence-grounded governance.
- **Evidence drives better decisions. Data builds that evidence.**