Assessing the effectiveness of interventions during the Mpox outbreak in Japan, 2023

Haruka Hayashi (1)
Hiroshi Nishiura (1)

1 : Kyoto University / School of Public Health

Background : Mpox clade IIb spread globally from 2022, mainly via sexual contact among MSM. Japan experienced its first surge of Mpox in early 2023, involving 252 confirmed cases and one death by March 2025. Various non-profit organizations carried out campaigns to raise the awareness via social media, in-person events, and posting an add in dating apps.

Objectives : The present study estimated R_t during the outbreak to evaluate the impact of these non-pharmaceutical interventions.

Methods : Weekly confirmed Mpox case data from January 2023 to May 2024 were analyzed. Timing and contents of interventions, including public campaigns, poster distribution, and online advertisements targeting MSM, were retrospectively examined. A renewal equation model was applied to estimate R_t on weekly basis, yet accounting for delay from infection to illness onset. Stepwise model selection was carried out to assess the intervention impact on Rt.

Results : Weekly R_t fluctuated around the value of 1, but stepwise model selection identified two key intervention weeks, week ?? and ?? in 2023 when public campaign and interventions using social media and dating app were implemented. The best model showed that R_t declined from 1.32 to below 1 after the first intervention week, with a relative reduction, 0.718.

Conclusion : This study estimated R_t during the 2023 Mpox outbreak in Japan, implying that timely campaigns that led to elevate the awareness campaigns possibly contributed to preventing secondary transmission.

jpinfect (R Package) for Notifiable Infectious Diseases from the Japan Institute for Health Security

Tomonori Hoshi (1,2)
Erina Ishigaki (1,3,4), Satoshi Kaneko (1,2,4,5),

1 : Institute of Tropical Medicine, Nagasaki University, Japan
2 : School of Tropical Medicine and Global Health, Nagasaki University, Japan
3 : London School of Hygiene & Tropical Medicine, London, UK
4 : Graduate School of Biomedical Sciences, Nagasaki University, Japan
5 : DEJIMA Infectious Disease Research Alliance, Nagasaki University, Japan

jpinfect is an R package provides a set of functions to acquire and post-process notifiable infectious disease datasets from the Japan Institute for Health Security. The package facilitates to generate combined datasets of weekly case reports since week 14th 1999 by prefecture, where available, sex and suspected location of infection information. In addition to its core functionalities, the package also includes three built-in datasets that have already been pre-processed using the provided functions. These datasets are ready for immediate analysis, making it easier for researchers, public health practitioners and educators to utilise officially released public data. The package is designed to streamline epidemiological research, enhance public health response and support educational efforts. Ultimately, jpinfect aims to assist researchers and practitioners in responding to notifiable infectious diseases in Japan efficiently. All package code is archived on GitHub, allowing users to extend its functionality and adapt it to their specific needs.

Suicide and ill-defined/undetermined deaths among large designated cities in Japan, 2008-2022

Takashi Yamauchi (1)
Takashi Shimazaki (1), Tadashi Takeshima (2), Kimiharu Iwadate (3), Machi Suka (1)

1 : Department of Public Health and Environmental Medicine, The Jikei University School of Medicine
2 : Regional Planning Institute, Taisho University
3 : Department of Forensic Medicine, The Jikei University School of Medicine

Background : Suicide deaths are defined as deaths due to "intentional self-harm" in accordance with the International Statistical Classification of Diseases and Related Health Problems 10th Revision. However, "ill-defined and unknown causes of mortality" and "accidents" may also account for hidden suicides. This study compared the state of deaths due to suicide and ill-defined/undetermined causes across urban areas in Japan between 2008 and 2022.

Methods : We analyzed vital statistics data including information on all deaths identified under suicide (ICD-10 codes X60-X84) and ill-defined/undetermined death categories (i.e., codes R96-R99, V01-X59, and Y10-Y34) among Japanese citizens aged ≥10 years who lived in a government ordinance-designated city. Standardized mortality ratios (SMRs) were calculated for each cause of death and compared among designated cities. Ethics approval was not required for this study according to the "Ethical Guidelines for Medical and Health Research involving Human Subjects" by the Japanese government, as this study involved a secondary analysis of national surveillance data that did not include any personally identifiable information.

Results : During 2008 to 2022, 242,975 deaths were identified. Mortality rates due to "intentional self-harm" for those aged ≥65 years decreased during the study period, whereas the rates due to "ill-defined and unknown causes of mortality" for those aged ≥65 years sharply increased by nearly three times. Substantial differences in SMRs for "ill-defined and unknown causes of mortality" were observed among designated cities.

Conclusions : In Japan, the state of deaths due to "ill-defined and unknown causes of mortality" significantly differed among designated cities. Attention must be paid to changes in the state of deaths due to ill-defined/ undetermined causes as well as "intentional self-harm."

New Insights into Mediation Analysis: A Comparison of Natural and Separable Effects

Etsuji Suzuki (1)
Tomohiro Shinozaki (2,3), Eiji Yamamoto (4),

1 : Okayama University / Graduate School of Medicine, Dentistry and Pharmaceutical Sciences / Department of Epidemiology
2 : the University of Tokyo / Interfaculty Initiative in Information Studies
3 : the University of Tokyo / School of Public Health, Graduate School of Medicine / Department of Biostatistics
4 : Okayama University of Science

As is well appreciated in the literature on causal mediation, the total effect of the exposure on the outcome can be decomposed into natural direct and indirect effects. If certain assumptions about confounding, positivity, and consistency are met, the so-called mediation formula can be used to identify these effects in nonparametric structural equation models with independent errors (NPSEM-IE). However, natural direct and indirect effects have been criticized because these rely on a specific cross-world quantity, and the so-called cross-world independence assumption is not empirically verifiable. Furthermore, interventions on the mediator may sometimes be challenging to even conceive. As an alternative approach, separable effects have recently been proposed and applied in mediation analysis, often in finest fully randomized causally interpretable structured tree graph (FFRCISTG) models. Under this approach, the exposure is assumed to be separated into two (or more) components, one having a direct effect only on the mediator and the other having a direct effect only on the outcome. Furthermore, each separable component can be intervened separately in principle, and the total effect can be decomposed into separable direct and indirect effects. These effects are defined without relying on any cross-world quantities and are claimed to be identifiable under assumptions that are testable in principle, thereby addressing some of the challenges associated with natural direct and indirect effects. In this presentation, we compare natural effects and separable effects under NPSEM-IE, highlighting their similarities and differences. Additionally, we illustrate these two approaches graphically using causal directed acyclic graphs, incorporating potential outcomes determined by NPSEM-IE. By examining their required properties and sufficient conditions for identification, we aim to provide deeper insights into mediation analysis.

Lower Urinary Tract Symptom-Based Clustering of Women in the 2023 Japan Community Health Survey

Kenji Omae (1)
Noritoshi Sekido (2), Nobuhiro Haga (3), Yasue Kubota (4), Motoaki Saito (5), Ryuji Sakakibara (6), Mikako Yoshida (7) Takahiko Mitsui (8), Naoya Masumori (9), Satoru Takahashi (10)

1 : Fukushima Medical University Hospital / Department of Innovative Research and Education for Clinicians and Trainees (DiRECT)
2 : Toho University Ohashi Medical Center / Department of Urology
3 : Fukuoka University / Faculty of Medicine / Department of Urology
4 : Nagoya City University Graduate School of Nursing / Department of Advanced Medical Nursing
5 : Kochi University / Kochi Medical School / Department of Pharmacology
6 : Tsudanuma and Dowakai Chiba Hospital / Neurology Clinic
7 : Tohoku University Graduate School of Medicine / Department of Women's Health Nursing & Midwifery
8 : University of Yamanashi Graduate School of Medical Sciences / Department of Urology
9 : Sapporo Medical University School of Medicine / Department of Urology
10 : Nihon University School of Medicine / Department of Urology

Purpose : To identify clinically meaningful clusters of lower urinary tract symptoms (LUTS) in adult women using an unsupervised machine learning approach and to examine their associations with patient-centered outcomes, including quality of life (QoL), willingness to pay (WTP) for treatment, and physician visits.

Methods : We analyzed data from 3,088 women aged ≥20 years in a 2023 nationwide Japanese internet-based epidemiological survey on LUTS. Principal component analysis reduced dimensionality across 16 LUTS, including storage, voiding, and post-voiding symptoms, as well as bladder pain and discomfort. Hierarchical clustering grouped participants based on symptom severity. QoL, WTP, and physician visits were compared among clusters.

Results : Three symptom-based clusters were identified : the mild/asymptomatic group (n = 1,635, 52.9%), the moderate storage symptom-dominant group (n = 1,224, 39.6%), and the severe complex group (n = 229, 7.4%). The identified groups had substantially different demographic characteristics and LUTS risk factors. The severe complex group, experiencing the highest symptom burden, was most affected in daily life, emotions, sleep/energy, personal relationships, and role, physical, and social limitations. The median monthly WTP was 500 yen ($3.5) in the mild/asymptomatic group and 1,000 yen ($7) in the other two groups. Physician visit rates were highest in the severe complex group but remained low at 11.8%.

Conclusion : An unsupervised machine learning approach identified three distinct LUTS clusters in adult women. Even in the most severely affected group, WTP was limited, and physician visit rates were low, highlighting significant unmet medical needs.