

# Development of a Rational Evaluation Method for the Daylighting Performance of Residential Environments

(Research period: FY 2022-2026)

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(Keywords) Housing performance indication system, daylighting, comfort, resident's evaluation

## 1. Introduction

One system for evaluation of the quality of houses is the housing performance indication system, which was based on the Housing Quality Assurance Act. The evaluation items for light and visual environment performance in this system specify the simple opening ratio and the ratio of openings by orientation as indexes related to daylighting from windows. However, the relationship between these indexes and light and visual environment performance is difficult for residents to understand, and the correspondence to the ratings used as target values for design has not been adequately established. Therefore, the purpose of this research is to improve the evaluation method for light and visual environments based on the diversifying needs of recent years. First, this report explains the results of a survey of residents concerning windows and the light and visual environment from windows.

## 2. Questionnaire Survey on Daylighting and View of Housing

The survey method was an online survey, in which replies were received via the internet. The survey was conducted in January 2023. The survey regions were three areas with different annual hours of daylight and sunrise/sunset times (Tohoku region: Akita Prefecture, Yamagata Prefecture; Kanto region: Chiba Prefecture, Ibaraki Prefecture; Kyushu region: Kumamoto Prefecture, Kagoshima Prefecture). The respondents were 1,000 persons assigned by age and gender from 10,000 persons who participated in a preliminary survey. The main survey items were items related to "Room and window specifications" (size of rooms and windows), "External conditions" (spaciousness of outdoor space, visibility of the sky) and "Evaluation of light and visual environment" (degree of satisfaction with daylight from windows and the view from windows).

Among the questionnaire items, **Figure** shows the relationship between the results of an evaluation of "Good entry of natural light," which is related to daylighting, in 5 levels (5: I think so, 3: Not particularly good or bad, 1: Don't think so.) and the size of windows. As indexes of window size, the figure shows two cases,

the opening ratio (ratio of the window area to the room floor area) and the total window area. The degree of daylighting can be explained more convincingly by the total window area. Moreover, as the visibility of the sky from windows increases (larger values), the evaluation of daylighting also improves, and the degree of that effect could be confirmed.

## 3. Future Outlook

In the future, we plan to study inclusion of the effect of the view from windows in the housing performance indication system, in addition to the evaluation of daylighting, and will work to improve the evaluation method for the light and visual environment in response to diverse needs.

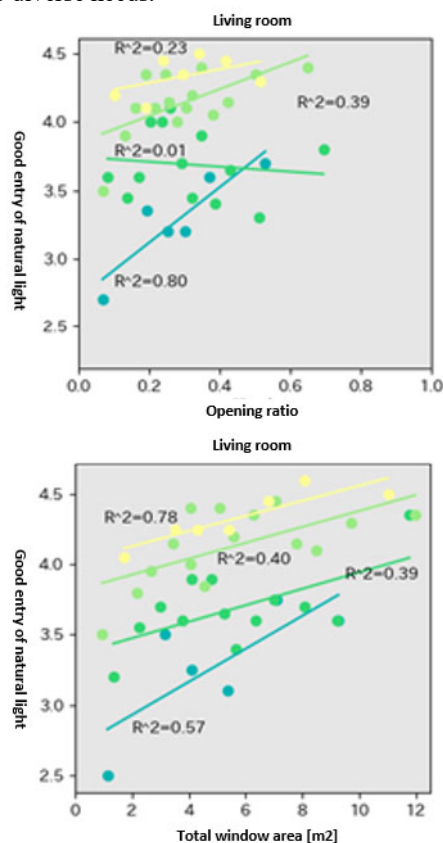


Fig. Relationship of window opening ratio and area and evaluation of daylighting