

# A Research on the Preference of Toilet Types of International Department members and its Relationship with Gender

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## 1 Research Question

In order to cater to the foreign teachers, the relevant departments equip the International Department of the school with many sitting toilets in bathrooms. The resulting ratio of sit toilet to squat toilet is roughly a:b. However, whether the current situation is really consistent with the demand for the faculties and students in the International Department in general, given that a majority of the teachers and students are Chinese natives, remains questionable.

We are interested in this question because two members of our group have strong preference of using squat toilets to sit toilets and thus usually cannot find a spot when needed. Our personal experiences have prompted us to question the existing allocation of toilet types and seek statistical evidence to support our concerns.

The distribution of toilet types in the International Department building is really different from the National Department building. We observed that there is only one sit toilet per bathroom in our department, while in the national department building squat toilets are the outliers. In order to know whether the distribution of toilets in the International Department building meets the needs of most students and teachers, we aim to conduct a few hypothesis tests to test if the school's current allocation of the types of toilets is reasonable.

## 2 Background Research

BNDS has the largest international faculty proportion in Beijing. This is because the school board has attached to the open philosophy of building a diverse school, according to Jun Tian, the school president. Specifically, bathrooms in BNDS differ greatly across the International Department and the Normal Department. There are far more sit toilets than squat toilets in the Aspirational Building (the teaching building of the International Department).

Such an uneven allocation of toilet types was designed to facilitate Western teachers using bathrooms. There is a significant biological difference between Western and Orient People. Most Westerners, when performing a task that requires lowering their body to the ground, usually do it with “genuflexion (one knee on the ground), kneeling (both knees), squatting with heels up sacrificing balance and stability, or on all fours – like scrubbing a carpet or tiling a floor” [2].

This unique biological attribute disables Westerners to perform Asian Squats and makes using squat toilets uncomfortable and difficult, which can reduce pressure on joints and bones. When they use squat toilets, their knees or feet and lumbar become awkward [3]. And this may account for why many Western people prefer sit toilets to squat toilets.

Differently gendered people have different toilet preferences. According to research from PLOS Global public health, women are more reluctant to use public toilets compared to men [1]. We will provide customized suggestions (based on gender) for the school’s toilet improvement.

### 3 Sampling and Experimental Design

- **Variables:** In our sampling and experimental design, there are two variables. The first variable is students’ and teachers’ preferences for choosing a sitting toilet or a squatting toilet. The second variable is gender.
- **Type of study:** Observational Study. There is no treatment in this design. We will conduct a survey to collect data about the preferences of people for sitting toilets and squatting toilets.
- **Data collection:** The data is collected through the questionnaire. The questionnaire contains two questions. The first question is the gender of the student who completed the questionnaire. The second question is the preferences of the student.
- **Scope of inference:** We can’t establish the causal links because in our design we want to construct a chi-square test. For the population, if we suppose the population is the whole people in the international department in BNDS, we can generalize the population at large.

### 4 Exploratory Data Analysis

We received a total of  $n$  valid questionnaires, among which  $n$  people (Male:  $n$ , Female:  $n$ ) have a preference for different toilets.

Table 1: Statistics of gender and preferences

Gender	Squat Toilet	sit Toilet	Total
Male	$n$	$n$	$n$
Female	$n$	$n$	$n$
Total	$n$	$n$	$n$

Each voter has two votes. If one prefers squat toilets or sit toilets more, one can vote twice for it, while if one has no preference, one can vote for both squat toilets and sit toilets once.

With the data collected, we first conduct a chi-square test of goodness-of-fit to compare the expected value of the ratio of squat toilet and sit toilet and the observed value of the ratio of squat toilet and sit toilet. The sample should be randomly selected and large. (Expected counts  $\geq 5$ )

Moreover, we can conduct a chi-square test of independence for preference of toilets to determine whether one's preference of the type of toilets is independent of his or her gender. The sample should be randomly selected and large. (Expected counts  $\geq 5$ ).

## 5 Data

\*1. 您的性别? (Gender)

<input type="radio"/> 男 (Male)
<input type="radio"/> 女 (Female)

\*2. 您对于坐便器和蹲坑的偏好? (Squat or Sit Toilets)

<input type="radio"/> 坐便器 (Sit Toilets)
<input type="radio"/> 蹲坑 (Squat Toilets)
<input type="radio"/> 没有偏好 两者都可以 (Either)

Figure 1: The example of questionnaires

The above is the questionnaire. It consists of two questions, asking the sex and the preference for the type of toilet.

## 6 Time Table

Table 2: Time table

Time	Tasks
By May 17th	Design sampling method and experiment
By May 19th	Collect all questionnaire
By May 21th	Finish the hypothesis test for two tasks
By May 24th	Finish the essay

## 7 Distribution of work

In this task, all group members are responsible for data collection and essay writing. Louie and John are responsible for background research and literature review. Tony and Alan are responsible for data analysis. John is also responsible for composing the essay.

## References

- [1] Kimmo Eriksson, Thomas E Dickins, and Pontus Strimling. Global sex differences in hygiene norms and their relation to sex equality. *PLOS Global Public Health*, 2(6):e0000591, 2022.
- [2] Rakesh Goyal, Shakti A Goel, and Nishant Bhatia. Determination of outcomes of complex upper end tibial fractures in squatting and cross leg sitting south asian population. *Injury*, 52(6):1569–1576, 2021.
- [3] Fanjia WANG, Chenlei ZHOU, Lina LUO, Shangjun HUANG, and Wenxin NIU. Comparison of the lower limb kinematics and muscle activation between asian squat and western squat. *Journal of Medical Biomechanics*, pages E705–E711, 2021.