

Behavioral Changes between the Two Time Periods in Yokohama and Toyosu

Sep. 23, 2019

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Innovation in Work Style (働き方改革)

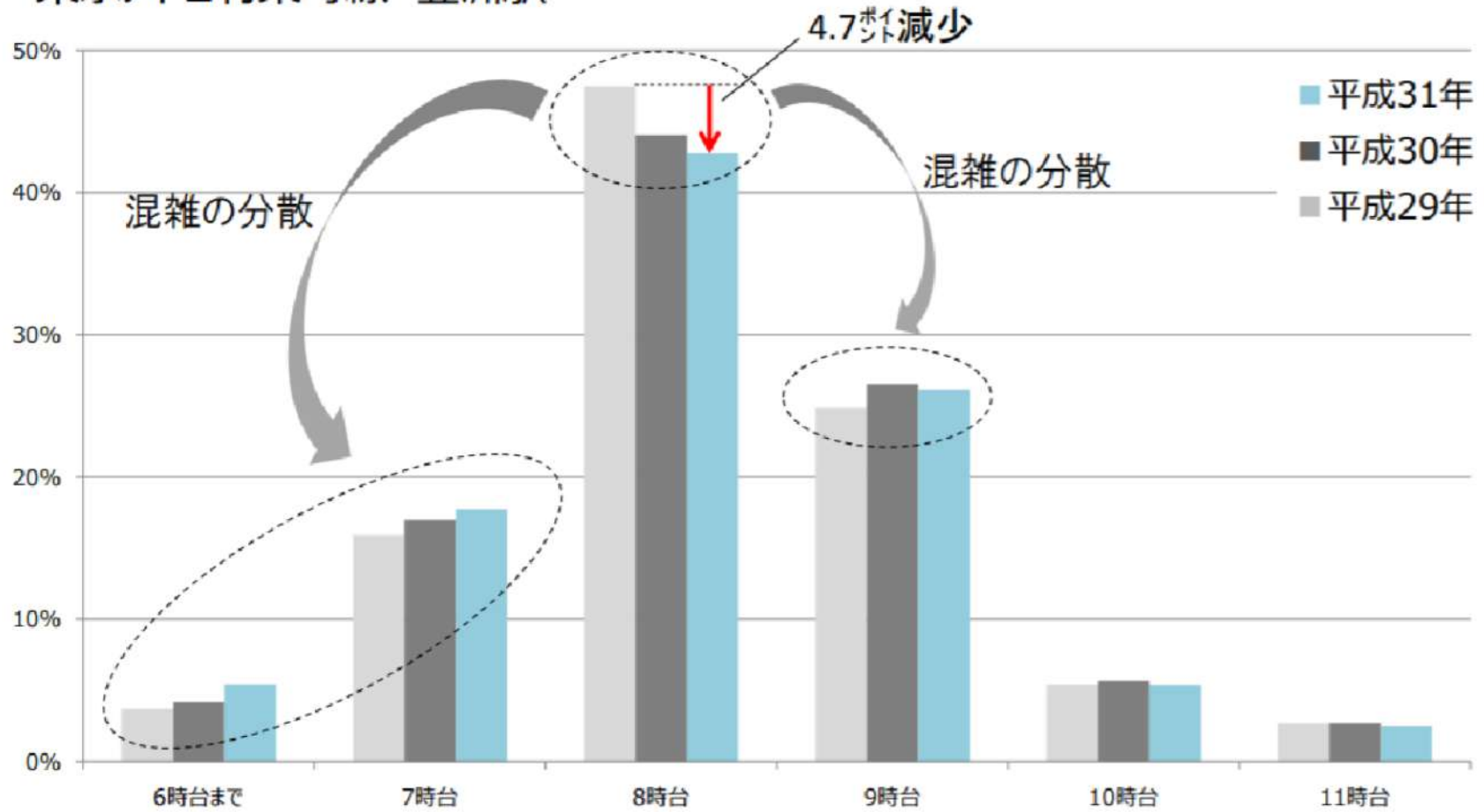
- Jisa-Biz (時差Biz)
 - Began in 2017 by the Japanese government
 - Encourages the shift in the departure time of commuting trips to alleviate the congestion in the morning peak period
 - Encourages tele-working as well
- Have perhaps affected workers' behavior in recent years

Other Changes in work style

- Increase in women's participation rate
- Departure from prolonged work
- Promoting elders' participation

■ピークの分散が見られた駅（4日間平均）の出場者割合の分布

東京メトロ有楽町線 豊洲駅



Objective

- To identify changes in behavioral pattern between two different time periods, especially considering possible changes in work style
- To model travel-activity patterns from two different data sets

Data

- Two trip data sets from probe-person surveys in Yokohama in 2008 and Toyosu in 2018

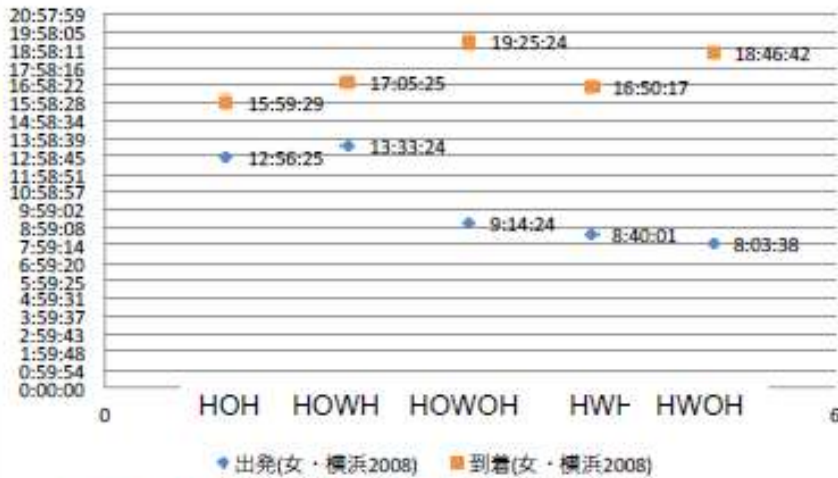
Methodology

- Tour-based analysis focusing on tour patterns
 - Tour = Home-based trip chain

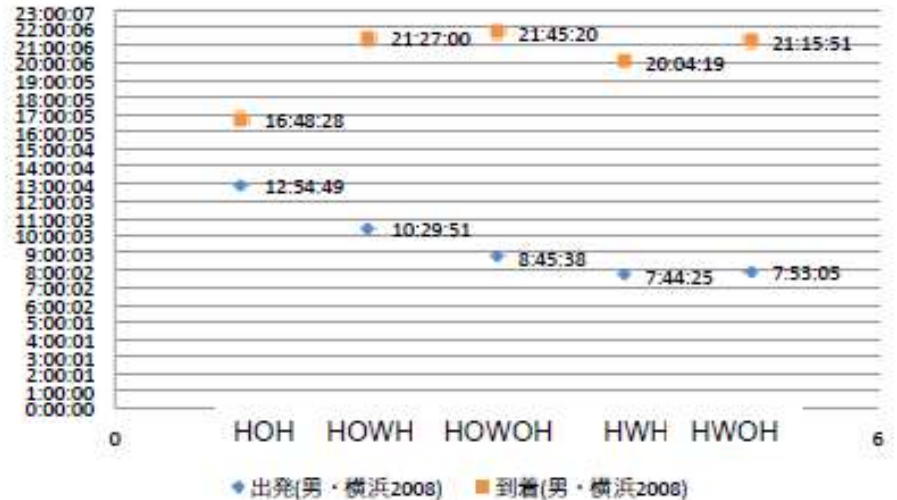
1.4 Aggregation Results (基礎集計結果)

Mean averages of departure/arrival times of tours Yokohama, 2008

Woman



Man



Toyosu, 2018

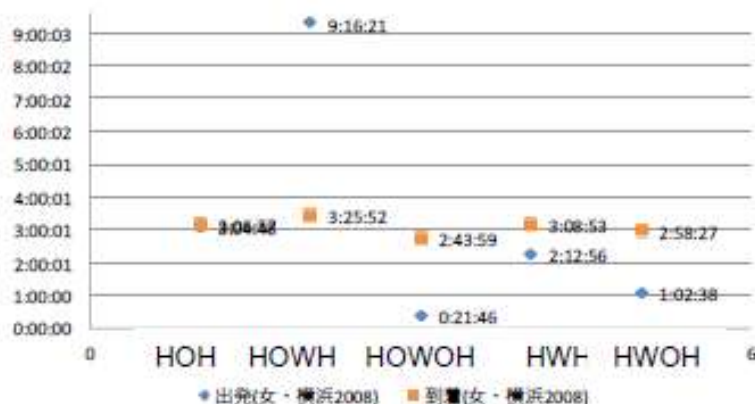


1.5 Aggregation Results (基礎集計結果)

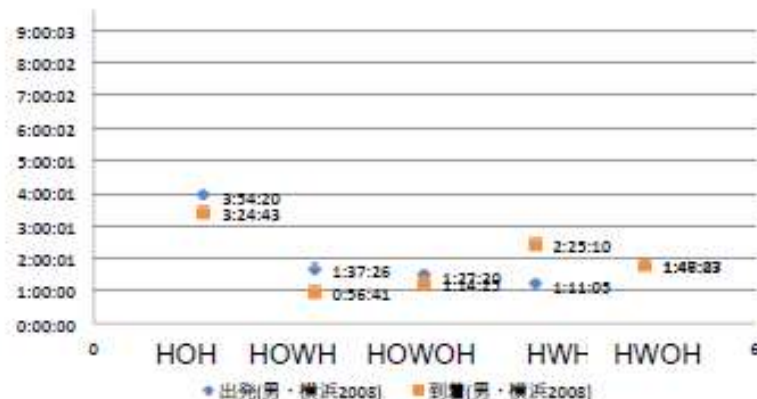
Standard deviations of departure/arrival times of tours

Yokohama, 2008

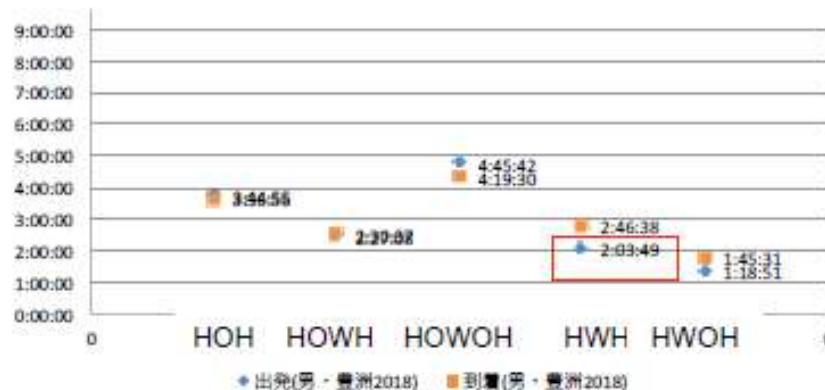
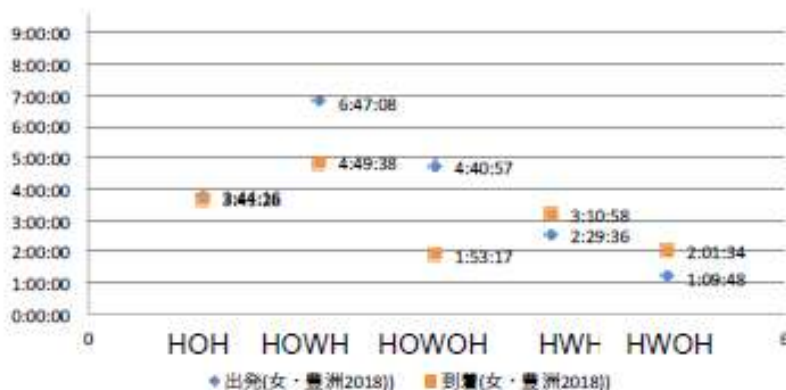
Woman



Man



Toyosu, 2018



We use multiple regression model

- We would like to compare the estimation result of two data sets(Toyosu and Yokohama)

$$y_{dep_time} = \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \dots + \beta_{20} x_{20}$$

$$y_{arr_time} = \alpha_1 x_1 + \alpha_2 x_2 + \alpha_3 x_3 + \dots + \alpha_{20} x_{20}$$

出発時間と到着時間を目的変数に,性別,,年齢層,行動パターン,トリップ数,距離,トリップ時間をダミー変数を交えてモデル作成を試みる

パラメータを比較することで,時代変化の影響を捉える

- 推定結果の表 出発時間

推定表	出発時間(Depart time)			
	変数(Variable)	Parameter	t値	p値
	(Intercept)	3.30E+04	55	***
	トリップ数(Trips)	-414	-2.3	*
	男性(Man)	-1815	-3.5	***
	20代(20s)	-1063	-2.1	*
	40代(40s)	-3043	-6.4	*
	HOWH	1.07E+04	5.3	***
	HOWOH	4.94E+03	3.1	**
	50代豊洲(50stoyosu)	-3588	-7.5	***
	豊洲男性(ToyosuMan)	1967	4.1	***
	50%距離(Distance50)	-0.1	-6.2	***

1. Remove trips without OD location record.
2. Combine two consecutive trips with the same purpose and less than one minute in between.
3. Order trips of each user in departure time and define a trip chain ending a return-to-home trip as a tour.
4. Remove all trips belonging to a tour whose origin and destination are at different locations.
5. Remove all trips belonging to a tour any two consecutive trips of which are unconnected (destination and origin are distant more than 400m).
6. Remove trips which consists an entire tour (i.e one-trip tour).
7. Remove trips belonging to a more than 24-hour-long tour.

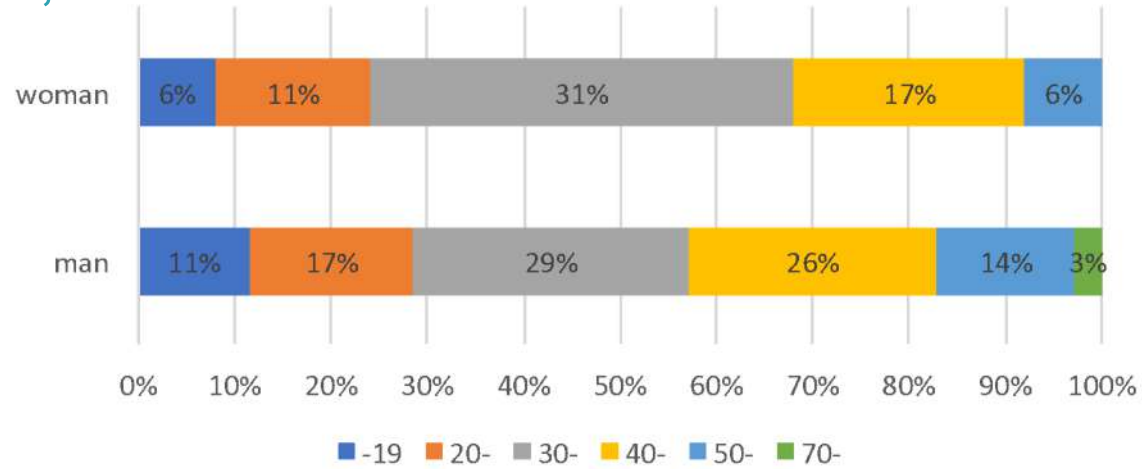
Toyosu, 2018

- Trips: 4,733 / 17,600 (27% of the original)
- Tours: 1,872
- Participants: 136 / 304 (45% of the original)

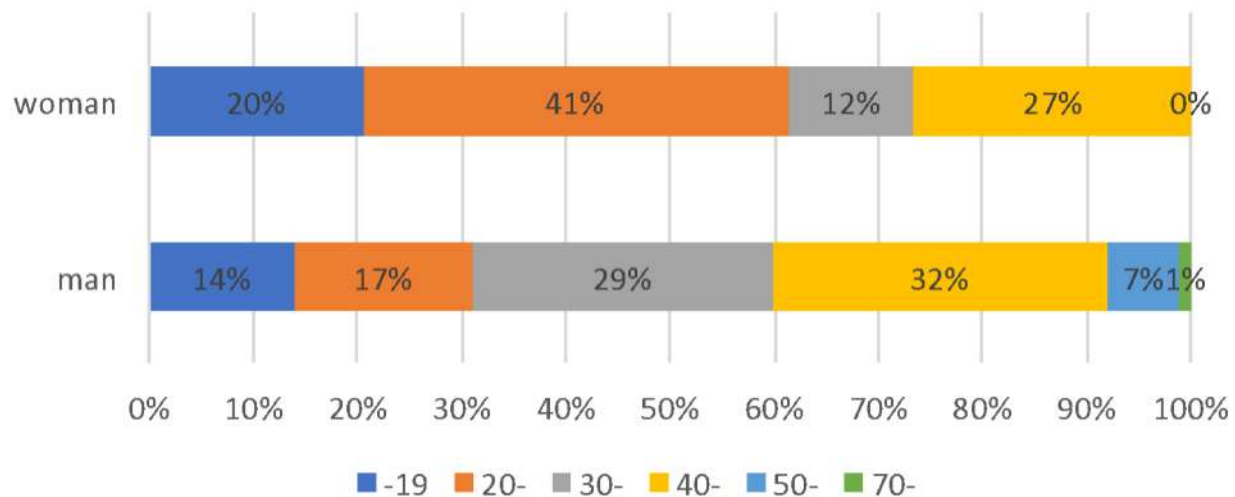
Yokohama, 2008

- Trips: 3,070 / 13,808 (22% of the original)
- Tours: 1,219
- Participants: 62 / 133 (47% of the original)

Yokohama, 2008

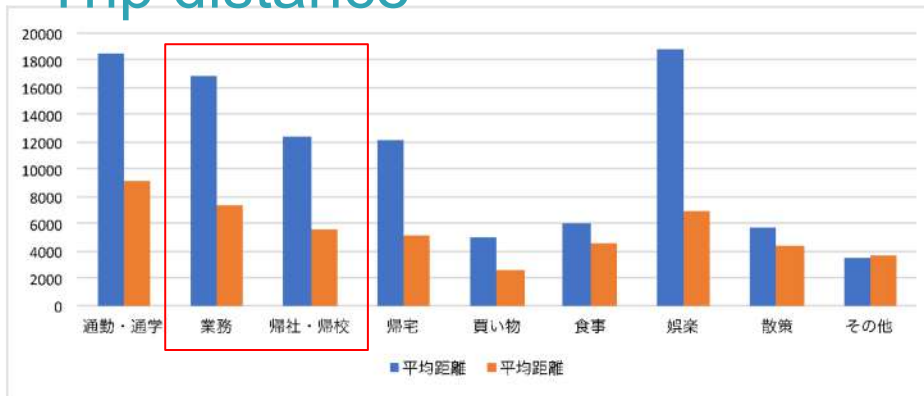


Toyosu, 2018

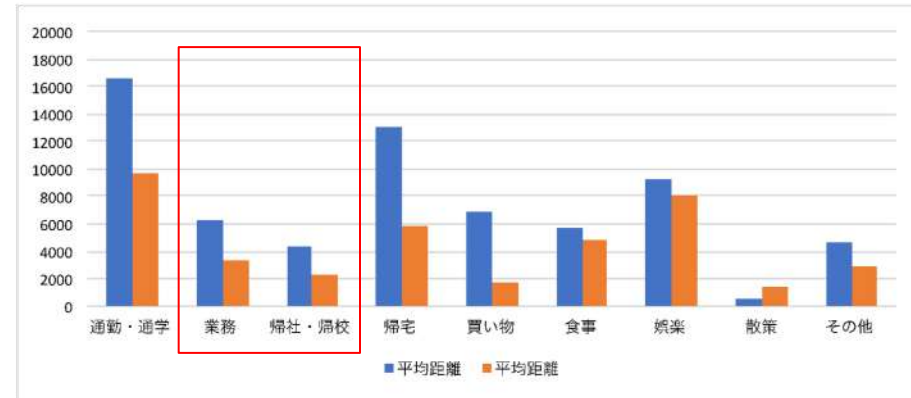


Yokohama, 2008

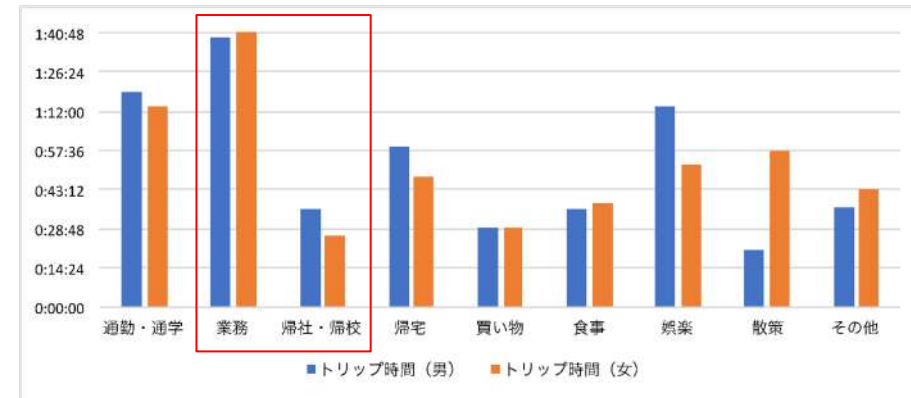
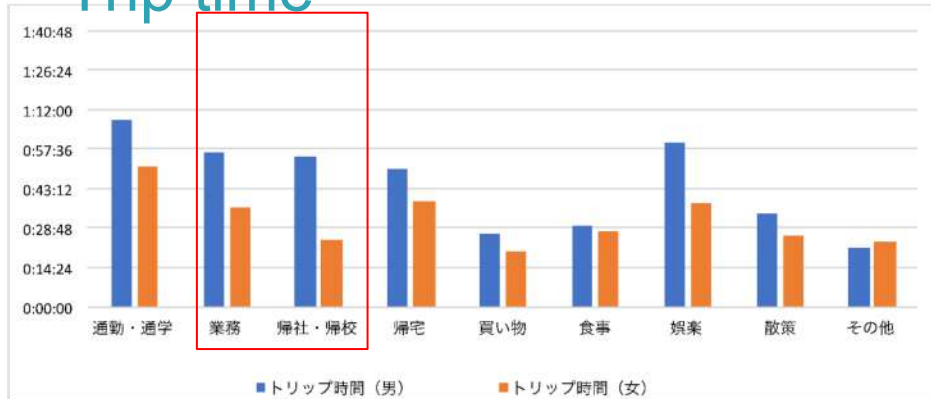
Trip distance



Toyosu, 2018



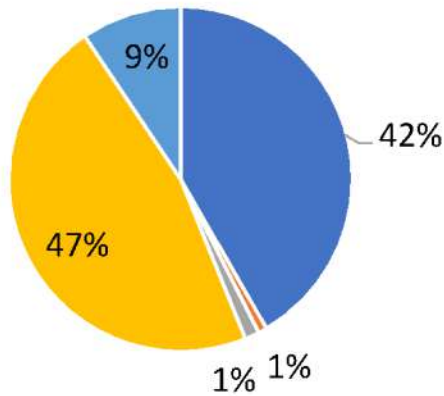
Trip time



1. Classify trips by their purpose into three categories:
 - H: Return to home
 - W: Commute or return to the office or school or business
 - O: Other
2. Represent a tour pattern as a string of the purpose classification
 - Ex. Working - Shopping - Return-to-home -> HWOH
3. Classify the tour pattern into six categories:
 - HWH: starts with HW ends with WH
 - HOH: has only Os between H...H
 - HWOH: starts with HW and ends with OH.
 - HOWH: starts with HO and ends with WH.
 - HOWOH: starts with HO, has at least one W and ends with OH.

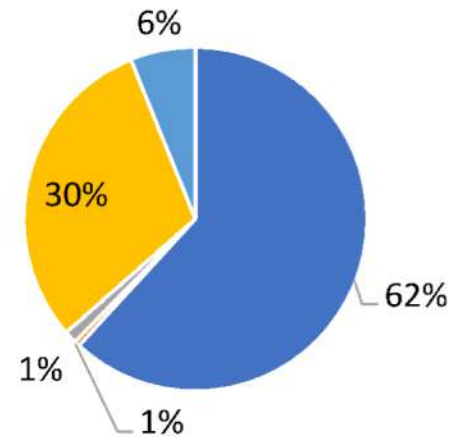
Yokohama, 2008

男性



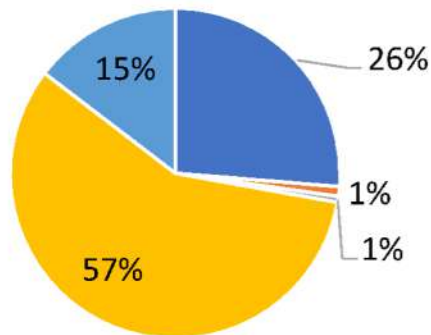
- HOH
- HOWH
- HOWOH
- HWH
- HWOH

女性

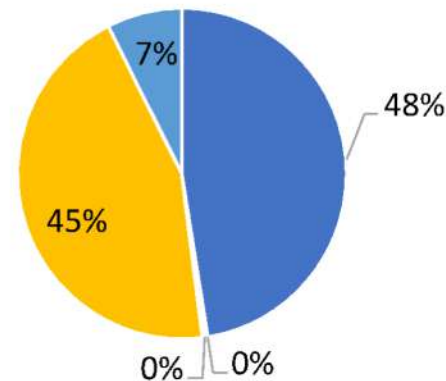


- HOH
- HOWH
- HOWOH
- HWH
- HWOH

Toyosu, 2018



- HOH
- HOWH
- HOWOH
- HWH
- HWOH



- HOH
- HOWH
- HOWOH
- HWH
- HWOH