**Naming Practice and Gender Equality Progress in Javanese Society:
A Computational Approach**

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Abstract

Unlike in Western society, Javanese people, the largest ethnic group in Indonesia, do not use family names, but only personal names representing their parents' hopes. The longer the names, the more aspirations the parents wish for their children. We use this naming practice as a proxy to investigate gender equality progress in Javanese society. Employing a computational approach in the form of quantitative text and statistical analyses on a publicly available massive dataset ($N = 2,906,978$), we found that despite personal names of both genders getting longer over the years, in general Javanese males have significantly longer names than their female counterparts, confirming our hypothesis. However, as predicted, their name length discrepancies eventually dissipate at different points in time for different regions. We further discuss how these findings may illuminate the progress of gender equality in Javanese society that spread from urban, to suburb, and finally rural areas.

Keywords: gender equality, Javanese, personal names, naming practice, name length

What's in a Name? Gender Equality Progress in Javanese Society

Unlike in Western society, it is not customary for Javanese, the largest ethnic group in Indonesia (Na'im & Syaputra, 2011), to have family names, let alone passing them to their offspring (de Grave, 2011). Typical Javanese people have only personal names consisting of one or more words given by their parents at birth (Uhlenbeck, 1969). When multiple words are used, one of them, not necessarily the first, will serve as a nickname by which someone is commonly referred to. The full name, on the other hand, will be used primarily for administrative purposes, such as identity cards and other legal documents. For instance, the full name of the 7th President of Indonesia (the current president when this article was being written), who is Javanese, is “Joko Widodo”. His nickname is “Joko” or more commonly “Jokowi”. His last name, “Widodo”, however, is not his family name. None of his three children share the same last name as him.

In Javanese culture, personal names usually represent parents' hopes for their newborns (de Grave, 2011; Kuipers & Askuri, 2017). The longer the names, the more aspirations the parents wish for their children. For example, President Joko Widodo named his three children from the oldest to the youngest after Sanskrit and Javanese words: “Gibran Rakabuming Raka” (the oldest son) meaning a smart, determined male who is wise and stays down to earth, “Kahiyang Ayu” (the middle child and only daughter) meaning the beloved and beautiful person, and “Kaesang Pangarep” (the youngest son) meaning the person who is expected to be a leader (Zhd, 2019). As mentioned before, none of them has “Widodo”, which is their father's last name in their names.

Being unique, Javanese naming practice is a means to study societal values. For example, some used it to examine the religious transition from Hinduism to Islam in the Indonesian archipelago (Kuipers & Askuri, 2017; Vickers, 1987). Historically, Javanese parents named their children after Sanskrit words and Hindu deities (Widodo, 2013). For examples, Dewa and Dewi (from Deva - देव and Devi - देवी) or Wisnu (from Vishnu - विष्णु). Once Islam was widely adopted in the archipelago, many Indonesians started to name their children after Arabic words and Islamic prophets like Ahmad (from Ahmed - أحمد), Muhammad (from Mohamed - محمد), or Nur (from Noor - نور). Interestingly, it is becoming more common for Indonesian and Javanese names to combine both Sanskrit and Arabic (Kuipers & Askuri, 2017), such as “Ahmad Dewa”, “Dewi Nur”, or “Muhammad Wisnu”.

Naming practices can also be used as a proxy for gender equality studies. In fact, it is not something new in sociological and psychological research. Naming practices have been subject to prolonged debate among Western scholars. For example, some ask why a wife must adopt her husband's last name once married, not the other way around (Hamilton et al., 2011; Lockwood et al., 2011; Scheuble et al., 2012). Others question why, most of the time, children must keep their father's family name rather than their mother's (Lockwood et al., 2011; Nugent, 2010). Similar issues exist in Javanese context, in that if genders are perceived equally, the lengths of males' and females' full names should be identical at the population level, indicating parents' aspirations for their sons and daughters are equal. Ergo, significantly different length of names may suggest that one gender is indeed favored over the other among the Javanese.

Women in Javanese Society

The concept of paternalistic culture in Javanese society has been known for it views men as more favorable and women as subordinate (Kurnia, 2020). Such patriarchal construction is symbolized in the common proverbs of women as a *"konco wingking"* (a colleague in behind) who should follow her husband in heaven or hell (*"swargo nunut neroko katut"*). The femininity identity leads to the limited social task of *"macak"* (dressing-up), *"masak"* (cooking), and *"manak"* (delivering offspring). The traditional beliefs of old Javanese culture explain the women in a less decisive status and have limited social movement (Pirus & Nurahmawati, 2020). The social position of a woman is determined by her husband's occupation and reputation in society. She is expected to show respect and devotion (*bekti*) towards her husband. Such attitudes are considered as the glorious symbol of Javanese women (Kurnia, 2020; Pirus & Nurahmawati, 2020).

The major religion Islam further legitimate the view of women as subordinate in Javanese culture. Islamic teaches that women's jihad is at home by being submissive to their husband and by being madrasah (schools) for their children (Bani & Pate, 2015). Women, once married, should put her husband first, even if they prioritize him over her parents (Pirus & Nurahmawati, 2020). In a more extreme example, she shall not go outside unless get permission from her husband even if their parents died. Moreover, in Islamic law, that is widely adopted in Javanese culture, women only get $\frac{1}{3}$ of their parents' legacy, while men get $\frac{2}{3}$. This belief is getting stronger as more Javanese women adopt the Islamic way of life to them (Smith-Hefner, 2007).

However, Javanese society has been gradually changing over the last few decades, primarily due to globalization and emancipation (Mulatsih & Putri, 2020; Pirus & Nurahmawati, 2020). Opportunities for Javanese women to improve their vulnerability and social status have been gradually expanding. In contemporary conceptual reflection, women are encouraged to take a more active role in supporting the family income without jeopardizing their roles as wife and mother (Dewi, 2012). As a result of gradual social change, an increasing number of parents believe that their daughters should pursue the same education as their sons to achieve family prestige as evidenced by the achievement of the Gender-Parity Index (GPI) of 1.00 for school enrollment rates among children aged 7 to 12 in 2019, up from 0.89 in the 1970s (Yarrow & Afkar, 2020). It entails a profound paradigm shift in modern Javanese society.

Pirus and Nurahmawati (2020) argue that such paradigm shift led by the modernized view of Javanese ideas towards women as a “*garwo*” – “*sigaraning nyowo*” (half of the husband’s life) and the evolved responsibility to achieve a status of “*dadi wong*” (being a successful person) as the duty of a married woman alongside with his husband in their newly created family status. Kuntjara (1997) shed light on the role of women's activists and organizational movement in supporting the challenge and objection of Javanese women to the traditional and old-fashioned culture. The growing number of educated Javanese women triggers the beginning of awareness towards greater gender equality. Thus, many women's organizational movements are genuinely concerned with addressing gender issues in the existing Javanese cultural system.

Current Study

Using a publicly available massive dataset of Javanese people's names born in Central Java between 1945 and 2001, we investigated how the difference in name lengths between males and females can reflect the trajectory of gender equality progress in Javanese society over time. We also examined how these trajectories differ across different regions (i.e., urban, suburb, rural), illustrating the divergent paths taken by different Javanese communities in their quest for gender equality. Considering how deep patriarchy is rooted in Javanese culture (Mawaddah, Suyitno, & Suhita, 2021; Munir, 2002), we hypothesized that Javanese males tend to have longer names than their female counterparts. Javanese parents arguably tend to wish for more

aspirations for sons than they do daughters so that they subconsciously give males longer names than females.

H_1 : Javanese males have longer names than Javanese females

Taking into account the paradigm shift in contemporary Javanese society (Kuntjara, 1997; Pirus and Nurahmawati, 2020), we further hypothesized that males' names used to be much longer than females' names in the past. As the years pass, the name length disparity between Javanese males and females narrows.

H_2 : The difference in name length between Javanese males and females gets narrower from time to time

Methods

Dataset

In this study, we used the lists of registered voters in the 2018 Regional Elections in Central Java Province. These lists were made publicly available by the Indonesian General Election Committee on their website without any restriction with main aim to hold the elections accountable¹. In 2018, there were 55,963 voting places spreaded in 6 municipalities and 29 regencies in Central Java. For each voting place, we scraped up to 40 data mimicking the stratified random sampling method using a Chrome application² in June 2020. This process yielded 2,906,978 rows of data, which include the voters' full names, sex, birthplace, and national identity card numbers (with some digits censored).

Officially, there are only two level-2 administrative regions in Indonesia: city (*kota*) and regency (*kabupaten*). However, we decided to add an additional category since some regencies are too vibrant to be categorized as rural and too sparse to be categorized as urban. As such, we then categorized them into three: urban (cities), suburbs (regencies sharing borders with cities), and rural (any other regencies) as shown in Figure 1. The anonymous version of the final dataset

¹ <https://infopemilu.kpu.go.id/pilkada2018>

² <https://webscraper.io/>

is available as supplementary materials. Table 1 shows our dataset in comparison with the actual population of Central Java.

Figure 1: The map of Central Java categorized into urban, suburb, and rural areas.

Table 1: Population and samples.

Category	Administrative Regions	Population*			Samples		
		Freq	%	Sex Ratio	Freq	%	Sex Ratio
Urban	Semarang City	1,814,110	5.23	96.19	138,697	4.77	94.08
	Surakarta City	519,587	1.50	94.61	45,115	1.55	94.94
	Pekalongan City	307,097	0.88	99.96	27,531	0.95	102.70
	Tegal City	249,905	0.72	98.02	20,901	0.72	99.13
	Salatiga City	194,084	0.56	95.66	19,502	0.67	95.82
	Magelang City	122,111	0.35	96.94	10,965	0.38	92.30
Suburb	Brebes Regency	1,809,096	5.21	99.69	154,104	5.30	97.59
	Tegal Regency	1,440,698	4.15	100.94	102,259	3.52	100.15
	Magelang Regency	1,290,591	3.72	98.12	104,350	3.59	99.59
	Klaten Regency	1,174,986	3.38	97.79	111,326	3.83	98.85
	Demak Regency	1,162,805	3.35	102.74	91,980	3.16	100.61
	Semarang Regency	1,053,786	3.04	96.33	70,364	2.42	94.85
	Kendal Regency	971,086	2.80	96.53	89,395	3.08	100.28
	Pekalongan Regency	897,711	2.59	98.64	58,465	2.01	103.02
	Sukoharjo Regency	891,912	2.57	98.77	53,683	1.85	97.10
	Karanganyar Regency	886,519	2.55	100.66	85,749	2.95	94.72
	Batang Regency	768,583	2.21	98.15	72,801	2.50	98.08
Rural	Cilacap Regency	1,727,098	4.97	100.34	161,316	5.55	99.81
	Banyumas Regency	1,693,006	4.88	99.79	158,255	5.44	100.40
	Grobogan Regency	1,377,788	3.97	97.58	125,152	4.31	102.00
	Pemalang Regency	1,302,813	3.75	100.35	117,031	4.03	97.25
	Pati Regency	1,259,590	3.63	99.13	95,895	3.30	102.79
	Jepara Regency	1,257,912	3.62	97.21	94,401	3.25	102.12
	Kebumen Regency	1,197,982	3.45	102.75	92,520	3.18	95.60
	Boyolali Regency	984,807	2.84	96.93	91,760	3.16	101.22
	Wonogiri Regency	959,492	2.76	94.51	86,750	2.98	94.78
	Purbalingga Regency	933,989	2.69	96.00	82,201	2.83	100.51
	Banjarnegara Regency	923,192	2.66	97.82	80,615	2.77	98.84
	Sragen Regency	890,518	2.56	96.85	73,471	2.53	95.80
	Kudus Regency	871,311	2.51	99.26	71,303	2.45	99.61
	Blora Regency	865,013	2.49	93.90	68,353	2.35	103.19
	Wonosobo Regency	790,504	2.28	96.91	67,705	2.33	99.63
	Temanggung Regency	772,018	2.22	99.38	65,834	2.26	94.25
	Purworejo Regency	718,316	2.07	100.40	65,505	2.25	103.58
	Rembang Regency	638,188	1.84	97.96	51,724	1.78	99.11
Total		34,718,204	100.00	98.32	2,906,978	100.00	98.85

*Source: 2010 Population Census (Badan Pusat Statistik, 2019)

Procedures

We performed the following data preprocessing prior to conducting all statistical analyses in R 3.6.3.

Identifying

We used the birthplace to identify if someone is Javanese. Considering 96% of Javanese people live in Central Java (Na'im & Syaputra, 2011), only those born and voting in this province were deemed Javanese in this study. For practical purposes, we derived someone's gender from the listed sex (i.e. male/female). Then, we parsed select digits of the national identity card numbers to get someone's birth year using the guidelines stated in the national law (Peraturan Pemerintah Republik Indonesia Nomor 37 Tahun 2007).

Cleaning

Once identified, we cleaned the Javanese people's names from academic (e.g., Dr, Ir) and religious (e.g., H, Hj) titles since those were not part of the names given at birth. However, we decided to keep noble Javanese titles (e.g., "Raden" for males and "Raden Roro" for females, sometimes written in abbreviation as "R" and "Rr" respectively) since they are part of children's personal names given by their noble parents. Moreover, their percentages are very small such that they hardly affect the results.

Counting

We then counted both numbers of characters and words for each cleaned name. For instance, we counted 10 characters and 2 words for a male name "Joko Widodo". Likewise, we counted 10 characters and 3 words for a hypothetical female name "Ayu Kirana P". Occasionally, some names are abbreviated by a single letter due to the variety of local civil registration practice. In the female's example, "P" may stand for "Putri". Thus, her full name is actually "Ayu Kirana Putri" instead of "Ayu Kirana P". However, we do not have enough data to accurately correct such abbreviations without making too many assumptions. Ergo, combining the two methods of counting arguably gave us a more accurate measure of the name lengths.

Data Analysis

We began the statistical analyses by examining the differences between the length of Javanese males' and females' full names born in different regions over time. Following this, we performed a principal component analysis (PCA) to transform the name length measures (i.e., characters and words) into a single variable. We then subgrouped the data based on birth year (1945-2001) and birthplace categories (i.e., urban, suburb, rural) yielding 57 groups. For each group, we employed a Welch's T-test on the PCA scores to examine if the length of males' and females' names were significantly different. Welch's T-test is more reliable to examine differences on two samples with unequal variances or unequal sizes (Delacre et al, 2017; Ruxton, 2006). Finally, we calculated the effect size using Cohen's D approach on each group to help interpret the t-test results. It is worth noting that even though this dataset has time properties, methodologically, it is still a cross-sectional data collected at the same point in time. Thus, the use of t-tests is justified. We omitted tests across birth years and birthplaces due to unbalanced data. Regardless, the results can still be compared across years and areas. The complete source code for all steps of data analysis are available as supplementary materials.

Findings

The identification process yielded 2,589,685 observations as summarized in Table 2. As many as 10.91% of registered voters in the original dataset were omitted as they were not born in Central Java.

Table 2: Numbers of identified Javanese people by birth year and birthplace.

Birth year	Born in Urban		Born in Suburb		Born in Rural	
	Male	Female	Male	Female	Male	Female
1945-1952	12,841	14,110	18,404	20,517	52,244	55,926
1953-1960	22,511	23,972	30,284	32,026	82,049	84,314
1961-1968	30,242	32,292	39,821	43,080	105,672	113,746
1969-1976	37,839	37,520	47,427	47,223	120,237	122,324
1977-1984	45,342	43,380	61,622	58,057	142,202	137,516
1985-1992	42,686	40,393	58,813	59,239	136,601	131,949
1993-2001	39,187	37,740	46,073	45,858	120,206	116,300
Total	230,648	229,407	302,444	306,000	759,211	762,075

Figure 2 presents the average lengths of characters (top) and words (bottom) of Javanese people's names by gender, birth year and birthplace category. The shaded areas denote the standard deviations. As illustrated, in the early independence era (1945-1960), Javanese males tended to have longer names than Javanese females for both characters and words regardless of the birthplace. However, as years progressed, the discrepancy got narrower with some notable patterns. In this respect, despite both names getting longer from time to time, males' names remained having more words but fewer characters while females' names having more characters but fewer words. Among other groups, Javanese females born in rural areas had the shortest names in all years.

Figure 2: The length of Javanese people's names. While both males' and females' names get longer from time to time, the discrepancy between the two gets narrower over the years with some notable patterns. Males' names tend to have more words but fewer characters, whereas females' names tend to have more characters but fewer words.

As shown in Table 3, the PCA results support our decision to combine both the length of characters and words in this study. The first principal component used as the new variable can explain up to 93.5% proportion of variance with equal contribution from both characters and words. Ergo, we only used scores derived from the first component in both t-tests and effect size tests.

Table 3: Contribution of the variables in PCA results.

Variables	Component 1	Component 2
Character Length	.50	.50
Word Length	.50	.50
Eigenvalue	1.870	.130
Proportion of variance	.935	.065
Cumulative proportion	.935	1.000

Figure 3 presents Welch's t-statistics. Higher values indicate higher discrepancy in length between Javanese males' and females' names in a given birth year and birthplace. Positive values denote that males' names were longer than females' names, and otherwise for negative values. We used a small significant threshold ($p < .001$) to deal with the over-power effect due to our massive dataset. As illustrated, the length discrepancies are eventually no longer significant (depicted by black dots) first in the urban areas (early 1950s), then in suburbs areas (mid 1960s), and finally in rural areas (late 1970s).

Cohen's D effect sizes are depicted in Figure 4. They demonstrate, inextricably connected to the t-test results, that the disparities in the length of Javanese males' and females' names progressively became negligible ($\leq .20$), first in urban regions, then in suburbs, and lastly in rural areas.

Figure 3: Welch's t-test results on gender differences in Javanese people's names. The t-statistics of the discrepancy between Javanese males' and females' names (measured as PCA scores) turned out to be not significant (depicted by black dots) starting in urban, then suburb, and finally rural areas.

Figure 4: Cohen's D effect size of gender differences in Javanese people's names. It clarifies that in the population level, Javanese females, regardless of their birthplace, were never given names significantly longer than Javanese males by their parents.

Figure 4 (right) also clarifies that despite the t-test results showing Javanese females born in the 1980s in rural areas had significantly longer names compared to their male counterparts as shown in Figure 3 (right), the effect sizes remain negligible. In other words, from the independence year through the millennium, in rural areas, Javanese females were never given names significantly longer than Javanese males by their parents. The same thing also applies to those born in urban and suburban areas. The details of all descriptive statistics and test results are provided in the supplementary.

Discussion

The analysis has confirmed our hypothesis that, on average, Javanese males were given longer names by their parents than their female counterparts. As previously stated, it arguably reflects the deeply ingrained patriarchy bias in Javanese society, which favors sons over daughters (Kurnia, 2020). Female descendants are given shorter names by their parents reflecting their lower expectations, as they are expected to stay at home and assist their husband with domestic tasks (Pirus & Nurahmawati, 2020). This subconscious bias is most pronounced in older generations living in rural areas, which have historically had less exposure to progressive values than urban areas. However, as years progress, this bias dissipates, as evidenced by the more equal length of Javanese male and female names.

One may ask if in Javanese, words denoting masculinity (m) are longer than words denoting femininity (f). To our knowledge as natives, many Javanese masculine-feminine related words have relatively the same lengths such as “kartiko” (m) and “kartika” (f) meaning shining star, “wardhana” (m) and “wardhani” (f) meaning love. In the case the length is different, feminine words are, in fact, often longer than masculine words such as “wan” (m) and “wati” (f) meaning the doer or “dimas” (m) and “diajeng” (f) denoting polite salutations. Thus, attributing the name discrepancy to the word morphology is less supported. Regardless, it may explain why females tend to have more characters but fewer words albeit not statistically significant than males in the latter years.

The increasing length of Javanese females' names, we argue, goes hand in hand with the fact that more Javanese women had achievements in the fields predominated by males. For example, in 1985, Pratiwi Pujilestari Sudarmono was selected as the first female astronaut for a

NASA space mission representing Indonesia (Dania & Raditya, 2019). In 1997, Sri Rahayu Basuki, better known as Yayuk Basuki, became the highest-ever ranked Indonesian tennis player in the world (Merdeka, n.d.; WTA Tour, 2021). In 2001, Dyah Permata Megawati Setyawati Soekarnoputri, better known as Megawati Soekarnoputri, the daughter of Indonesia's first president, Soekarno, was appointed as the country's first female president (Andryanto, 2021; Indonesia.go.id., n.d.). These remarkable milestones arguably inspire Javanese parents at given times to wish for more equal aspirations for their daughters so that they collectively give them a relatively equal length of names as for their sons reflecting more equal aspirations. A good indication of the paradigm shift in contemporary Javanese society in terms of gender equality.

Indeed, this gender equality progress may not reflect the relationship between wife and husband. It could be the case that such gender inequality still remains, in which women need to be submissive and support their husband no matter what. The fact that such changing names after marriage does not exist in Javanese society, we could not verify using similar techniques. Regardless, the results show the progress between how parents view their children's genders.

Limitations

While this study provides first hand evidence from a massive dataset to shed more light on the gender equality issues, particularly in Javanese society, it does have some limitations. First, we had to make gender assumptions from the listed sex and did not consider non-binary genders in the analysis due to the nature of the original dataset. Second, while it supports our hypothesis, such validation regarding the gender equality issues came from anecdotal examples. Other plausible explanations may exist, but they are difficult to prove.

Ethical Concerns

Scraping publicly available data from the Internet, even for the purpose of scientific research that gives a positive impact on society, may raise some ethical concerns (Dogucu & Çetinkaya-Rundel, 2021; Brewer et al., 2021; Rennie et al., 2020). As previously explained, during the data collection, the dataset was publicly available as HTML tables without any restrictions in terms of paywall, login/sign-up wall, or even CAPTCHA wall. On some occasions, the website had technical errors, and at the time of writing this paper, it no longer provided the same level of granularity as before. At its simplest form, research shall not cause

harm to participants. In online research, it is critical to keep the confidentiality of participants. To accomplish that, we do not share any personal information with others in this study. As such, the dataset available as supplementary materials has been anonymized. We included only the length of words and characters of each observation, not the actual personal names.

Direction for Future Studies

We suggest additional research to delve deeper into the qualitative aspect of Javanese people's names. It will be interesting to compare the meanings of words used in Javanese males' and females' names and examine if stereotypical gender associations, if any, have decreased over time just like in English words (Jones et al., 2020). Finally, we recommend that the same study be replicated in other patriarchal as well as matriarchal cultures to ascertain similarities and differences.

Conclusion

Gender equality is never a quick or simple task. Even more so in a strong patriarchal root culture such as the Javanese, and when the inequality itself is nurtured in most families. As the smallest unit of community in society, families must lead this fight, instead. They can start with eliminating subconscious favoritism toward male children over female children. The good news is that our research indicates that it may have already begun, as the distinction between males' and females' names has eroded over time in Javanese society.

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