A Re-examination of Raffles's Statistics on the Population of Java in the Early Nineteenth Century

——Some Problems of Early Censuses——*

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Introduction

The remarkable population growth in Java in the nineteenth century has been discussed variously in terms of colonial administration and the productivity of wet-rice cultivation. Early writers simply cited colonial statistics directly, for example, a population figure of 4.5 millions in 1815 which doubled by 1850 [Taeuber 1965: 80; Myrdal 1968: 1395, etc.]. Works by population specialists published soon after expressed doubts about the reliability of these colonial statistics, especially those of the early period, and suggested lower rates of population growth. Without denying this remarkable growth, they modified the extraordinarily high growth rates into possible highest ones [Widjojo 1970: 27-47; Peper 1970, etc.]. They treated the population in an aggregated form, neglecting its composing elements and applied the commonsense assumption that the government census would have been underestimated, especially in the early days, without detailing the sources of underestimation. The present paper ex-

amines the components of the oldest colonial population statistics by Raffles, which have been largely neglected because of the charge of underestimation. By this procedure, I hope to shed light on some of the problems contained in historical statistics in general.

I Population Statistics of Java Collected by Raffles—Constitutional and Aggregational Problems

The population of Java is discussed by Raffles in his famous *History of Java* (Vo. I, pp. 61-72, and Vol. II, pp. 241-291). These statistics were accumulated during the British occupation of Java between 1811 and 1816. The former part contains two tables: the first (hereafter referred as General Table I) gives incomplete statistics by division for the year 1812-13; the second (hereafter referred as General Table II) gives statistics by province based on the census taken by British Colonial Government in 1815. The latter part presents more detailed statistical tables for each province in Java and Madura (hereafter referred as provincial tables), covering not only population but also landholding and agriculture. The most commonly cited of Raffles's statistics on Java are the total population of 4,615,270 and the native population of 4,499,250 as of 1815. The process of aggrega-

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tion to reach the total population, and the problems in the provincial tables will be examined below in order to evaluate Raffles's statistics.

In examining the aggregation of figures for the native population, it was found that in most cases the figures for individual provinces in Ganeral Table II coincide with those in the respective provincial tables, which means that the latter were the source for the compilation. Closer examination, however, reveals discrepancies for seven out of the total of twenty-one provinces.

(1)　The most serious discrepancy is found for Japára (Jepara) and Jawána (Juwana). The native population of 101,000 in General Table II, which is used to calculate the total native population, is much less than the 213, 427 shown in the provincial table. The native population of these provinces in General Table II is cited in round numbers as above, comprising 54,000 males and 47,000 females. This fact suggests that these are tentative figures used to complete General Table II, and that the provincial table figure for these provinces was obtained later. If the provincial table figure is correct, General Table II contains an under-estimation of 112,427 persons.

(2)　For Semaráng (Sumarang), the population of the provincial town, which is estimated separately to be 20,000 in the provincial table, is neglected in General Table II. The population of the town (and suburbs) would have included Chinese and others in addition to the native population, but no distinction is made between native and other population in the town.

(3)　For Yúgya-kérta (Yogyakarta), the native population in General Table II clearly includes Chinese and others. The sum of the population of the territory of the Sultan and that of Pachi-

tan(Pacitan), which was ceded to the British Government in 1813, is taken as the native population of this province in General Table II, but this includes 2,202 Chinese and others.

(4)　For Súra-kérta (Surakarta), Raffles's error in calculation in the provincial table is carried over to General Table II, making the native population 1,090 persons more than the correct one.

(5)　For Probolíng'go (Probolinggo, or Besuki), the native population in General Table II is smaller than the one in the provincial table by two persons, which may be an error in printing.

(6)　Minor errors in calculation are found for five provincial tables:

i)　The native population of Tégal (Tegal) should be corrected from 175,446 to 175,413 owing to the miscalculation.

ii)　The native population of Surabáya (Surabaya) should be 152,032, 7 persons more than in General Table II and the provincial table.

iii)　The native population of Pasúruan (Pasuruan) should be 107,742, 10 persons fewer than in General Table II and the provincial table.

iv)　The native population of Bankálang (Bangkalan) and Pamakásan (Pamekasan) should be 90,820, or 28 persons fewer.

v)　Native population of Súmenap (Sumenep) should be reduced to 114,894, or two persons fewer.

With the above revision, Raffles's original estimate of the native population would rise by 129,071 to a total of 4,628,321, an increase of 2.9 percent. Strictly speaking, this should be reduced somewhat to account for the Chinese population of the town and suburbs of Semár-ang. In addition, suspected misprints in the published provincial tables suggest possible dis-

crepancies between these and Raffles' original manuscripts, and also that minor correction is rather meaningless. It should thus be stressed that the major components requiring correction derive from the figures for Jápara and Jawána, and for Semárang.

The figures in General Table I were collected in native divisions or regencies under the immediate direction and management of the British Government in Java, two or three years prior to the compilation of General Table II. General Table I is thus incomplete, as Raffles himself admits, showing a total native population of only 2,249,342. The populations of certain divisions in this table are, however, larger than those of the corresponding divisions or districts in the provincial tables. If we assume that intentional under-reporting, which was common in those days, occurred in these divisions or districts in the later census of 1815, the higher figures may in fact be closer to the actual population in spite of the lapse of two or three years. With this assumption, the native population can be raised by 125,198 to make up the total of 4,753,519.

The figures in General Table I also suggest another problem with the statistics collected by Raffles. In the table, the native population is divided into three classes: chiefs, priests, and common people, of which the last is further divided into married and able-bodied people, marriageable people, and children under 10 years of age, each shown by sex. The total of these categories is far below the total number of natives. A similar arrangement is found in the provincial table for Bantam (Banten). In addition to "total population," which includes householders, married women, and children, this table shows "computed total population,"

which is much larger than the former even after deduction of the Chinese population as recorded General Table II. The total population is 193,946,[1] and computed total population is 221,714, while population of Chinese and others is 618. The ratio of computed total population to total population varies from 1.023 to 2.598 among the 36 districts. This arrangement might imply either the omission of certain categories of family status in the table, or the omission of certain villages. And this in turn raises doubts about the completeness of the total populations recorded for other provinces. It is possible that no account was taken of unreported parts of populations in calculating the totals.

The provincial table for Bantam shows another form of incompleteness in the population figures: for five southern districts, only estimated total populations are given which together total 9,890. This is too small for the area, implying underestimation as Raffles admits. The question arises of whether this is an exception that occurred only in Bantam, where British control had not yet permeated.

II Household Size

It is possible to calculate an "assumed" average household size by making use of about a half of the provincial tables for each regency or division in a province. The calculation procedure is as follows:

(i) In the case of Pakalúng'an, Semárang, Jípang and Grobógan (Jipang and Grobogan), Jápara and Jawána, Grésik, Surabáya, Pasúruan, and Besuki, the native population is divided by the number of native "Cultivators+Employed

1) There is an error in computation for this figure, but it is neglected here.

Table 1　General Table II

(Table exhibiting the population of Java and Madura, according to a census taken by the British Government, in the year 1815)

DIVISIONS	TOTAL Popula- tion	Males	Females	NATIVES			CHINESE, &c		
				TOTAL Natives	Males	Females	TOTAL Chinese, &c	Males	Females
JAVA									
European Provinces									
Bantam	231,604	106,100	125,504	230,976	111,988	118,988	628	352	276
Batavia and its Environs	332,015	180,768	151,247	279,621	151,064	128,557	52,394	29,704	22,690
Buitenzorg	76,312	38,926	37,386	73,679	37,334	36,345	2,633	1,591	1,042
Priángen Regencies	243,628	120,649	122,979	243,268	120,289	122,979	180	86	94
Chéribon	216,001	105,451	110,550	213,658	99,837	113,821	2,343	1,193	1,150
Tégal	178,415	81,539	96,876	175,446	80,208	95,238	2,004	915	1,089
Pakalúng' an	115,442	53,187	62,255	113,396	52,007	61,389	2,046	1,180	866
Semárang	327,610	165,009	162,601	305,910	154,161	151,749	1,700	848	852
Kedú	197,310	97,744	99,566	196,171	97,167	99,004	1,139	577	562
Grobógan and Jípang	66,522	31,693	34,829	66,109	31,423	34,686	403	223	180
Japára and Jawána	103,290	55,124	48,166	101,000	54,000	47,000	2,290	1,124	1,166
Rémbang	158,530	75,204	83,326	154,639	73,373	81,266	3,891	1,831	2,060
Grésik	115,442	58,981	56,461	115,078	58,807	56,271	364	174	190
Surabáya	154,512	77,260	77,252	152,025	76,038	75,987	2,047	1,010	1,037
Pasúruan	108,812	54,177	54,635	107,752	53,665	54,087	1,070	522	548
Probolíng' go	104,359	50,503	53,856	102,927	49,797	53,130	1,430	706	724
Banyuwángi	8,873	4,463	4,410	8,554	4,297	4,257	319	166	153
Native Provinces									
Súra-kérta	972,727	471,505	501,222	970,292	470,220	500,072	2,435	1,285	1,150
Yúgya-kérta	685,207	332,241	352,966	683,005	331,141	351,864	2,202	1,201	1,001
MADURA									
Bankálang and Pamakásan.	95,235	47,466	47,769	90,848	45,194	45,645	4,395	2,280	2,115
Súmenap	123,424	60,190	63,234	114,896	55,826	59,070	8,528	4,364	4,164
Grand Total	4,615,270	2,268,180	2,347,090	4,499,250	2,207,836	2,291,414	94,441	51,332	43,109

in Other Avocations" or by the number of native "Cultivators + Householders not Cultivators."

(ii)　For Bantam, the total population (including Chinese) is divided by the number of householders.

(iii)　For Tégal, the total population (including Chinese) is divided by the number of "Cultivators + Householders not Cultivators."

For the last two provinces, total population is used as a substitute for native population, which is not available. The average household size can only be "assumed" because of the obscure usage of the term "cultivators" to mean farming householders, or persons engaged in farming, or member of farming households. In the cases of Semárang and Tégal, the use of the category "Householders not Cultivators" suggest that "cultivators" is the number of householders. For other provincial tables more intricate procedure is necessary for the judgement. In the cases of Priángen(Priangan), Chéribon (Cirebon), Rémbang (Rembang), and Banyuwángi, "cultivators" means the number of members of

farming households. In the special case of Kedú (Kedu), the sum of the numbers "Attached to the Cultivation of the Soil" and "Employed in Other Avocations" equals the male population. The possibility that this designates only the adult male population is unlikely in view of the cultivated area. Thus, inadequate instruction by the central government to those conducting the census can be pointed out as one source of defects in Raffles's statistics.

The distribution of the assumed average household sizes thus obtained for divisions of the provinces is shown in Table 2. This reveals small average household sizes overall and wide variations in household size within a province. Raffles himself mentions the small size of the Javanese family: "The average number of persons in a family does not exceed four, or four and a half" [Raffles 1817:I, 70]. It is noteworthy that one-third of the divisions in Table 2 show an average household size of less than 3 members. In Besuki, particularly, 60 percent of the divisions have an average household size of between 2.00 and 2.99, and 28 percent (7

divisions) have smaller households of 1.00 to 1.99 members. Though it may be possible to regard these figures as representing those engaged in economic activity, this cannot be accepted for the whole of Besuki, as there also appears in the same table divisions with an average household size of 4.00 to 4.99. The frequent occurrence of incomplete reporting would have resulted in the above phenomena. If this is the case, a mechanism of underestimation has been detected here. Underlying this underestimation of population can be assumed to be the attitude of a government more interested in the numbers of taxable adults than of dependents. If we assume an average household size of 4.0 and consider the numbers "Attached to the Cultivation of the Soil" and "Employed in Other Avocations" to represent numbers of householders, the native population of Besuki can be estimated to be 188,320, or 1.82 times the reported population. If average hosehold size is as large as 4.37, then the population become exactly double the reported one. The case of Basuki may be rather ex-

Table 2 Number of Divisions by Average Household Size

Province	Population	Average Household Size						
		1.00–1.99	2.00–2.99	3.00–3.99	4.00–4.99	5.00–5.99	6.00–6.99	
Bantam	Total		15	17	1			33
Tégal	-do-			1	1		1	3
Pakalúng' an	Javanese			1	2			3
Semárang	-do-		1	11	4		1	17
Grobógan and Jípang	-do-		2	1	4	1	1	9
Japára and Jawána	-do-			1	3			4
Grésik	-do-				5	4		9
Surabáya	-do-			8	1			9
Pasúruan	-do-			1	1	1		3
Probolíng' go (Besuki)	-do-	7	15	1	2			25
Total		7	33	42	24	6	3	115

Table 3　Number of Divisions

Province	Population	.600 ~699	.700 ~.799	.800 ~.899	Sex Ratio .900 ~.999
Priángen	Not specified			1	6
Tégal	Javanese	1		2	
Pakalúng' an	-do-		1		2
Semárang	-do-				3
Kedú	-do-				6
Grobógan and Jípang	-do-			5	3
Japára and Jawána	-do-				2
Pémbang	-do-				3
Grésik	-do-				1
Surabáya	-do-			1	2
Pasúruan	-do-				1
Probolíng' go (Besuki)	-do-	1		3	12
Banyuwángi	-do-				1
Súra-kérta	-do-				1
Yúgya-kérta	-do-			4	2
Bankálang and Pamakásan	Madurese				2
Súmenap	-do-			2	4
Total		2	1	18	51

treme, but similar phenomena are found in other provinces.[2]

III　Sex Ratio

The native population is broken down by sex for each division in sixteen provincial tables. The sex ratios (male/female) calculated from these figures should be evaluated from the point of view of how they emerge out of the overall underreporting. Distribution of sex ratio by division is shown in Table 3. In Java, where women were treated almost equally to men,

2) The *cacah*, a family unit or household in traditional Java, is considered to have expanded in size in the later period. It is interesting that the household size in Raffles' period was small, as mentioned here.

there is no particular reason to expect a higher probability of survival for men. While there was a tendency for people to report as low a number of adult males as possible in an attempt to avoid taxation or corvee, the government tried to ascestain this figure as accurately as possible. Depending on the extent of underreporting, a great variation in sex ratio appears. Certainly, sex ratios of less than unity are predominant in the table, though the number above unity is also appreciable. Sex ratios of under 0.9 are found in 16.0 percent of divisions (21 out 131), while ratios of over 1.1 are found in 9.9 percent (13 out of 131). Extreme ratios are the 0.603 of Brebes in Tégal, and the 1.573 in Gila Raja, one of the islands belonging to Súmenap in Madura. In Brebes, the sex ratio is also low (0.606) among Chinese, suggesting a consistent ma-

by Sex Ratio

(males/females) 1.000 ~1.099	1.100 ~1.199	1.200 ~1.299	1.300 ~1.339	1.400 ~1.499	1.500 ~1.599	Total
3	2					12
						3
						3
12	2					17
4						10
1						9
2						4
						3
7	1					9
1	3	1	1			9
2						3
9						25
1						2
						1
3						9
	2					4
1					1	8
46	10	1	1		1	131

nipulation. In Gila Raja, the extraordinarily high ratio of boys to girls (2.795 or 587/210) affects the overall sex ratio. Because of the above situation, it is not practicable to adjust population figures by making use of the sex ratio.

IV Age Structure

Statistics revealing some form of age structure are available only from seven provincial tables: those of Bantam, Priángen, Surabáya, Súra-kérta, Yúgya-kérta, Bangkálang and Pamakásan, and Súmenap will be shown below for each.

The provincial table of Bantam shows the numbers of adults and children by sex for each of thirty-three divisions. Chinese are included but are negligible, accounting for 0.3 percent of the total population. From this the percentages of children were calculated for males and females in each division, and their distribution is shown in Table 4. The figures for males vary between 25.6% and 57.3%, and those for females between 13.8% and 46.4%. It is difficult to judge what caused this wide variation, though a high correlation is observed between the figures for males and females in the same division. Except in Bantam town, the percentage of children in the male population is higher than in the female one in the same division, which may reflect a difference in the definition of adulthood between male and female rather than a difference in their mortality. The population under 15 years of age in a stable population calculated by Coale and Demeny varies between 30.05% (Model East, Level 4, r=0) and

Table 4 Number of Divisions by Percentages of Male and Female Children, for Bantam and Priángen

(Figures for Priángen are shown in Parentheses)

Male \ Female	10.0–14.9	15.0–19.9	20.0–24.9	25.0–29.9	30.0–34.9	35.0–39.9	40.0–44.9	45.0–49.9	50.0–54.9	55.0–59.9	Total
25.0–29.9			1	1							2(1)
30.0–34.9	1			2(1)							3
35.0–39.9			1	4			(1)				5(1)
40.0–44.9				5(2)	3		(1)	(1)			8(4)
45.0–49.9				1	5	2	1		(1)		9(1)
50.0–54.9						1	2	2	(1)		5(1)
55.0–59.9							1		(1)	(3)	1(4)
Total	1	1	4(1)	10(2)	9	5(2)	3(1)		(3)	(3)	33(12)

39.73% (Model North, Level 1, $r=5.00$) for females on the assumption that: (1) the average age at first marriage for females is 15 years where there is a tradition of early and universal marriage tradition; (2) the mean life expectation for females at age 0 is lower than 27.5 (level 4); and (3) the population growth rate is 5.00 per 1,000. In Bantam, the percentage of children falls short of the lower limit of 30.05% in six divisions, and exceeds the upper limit of 39.73% in eight divisions.

In Priángen, the numbers of adults and children are shown by sex for cultivators and non-cultivators in each of 12 divisions. The distribution of percentages of children is shown in parentheses in Table 4. These vary between 31.6% and 56.7% for males, and between 29.2% and 58.1% for females. The percentage of children in the female population exceeds that in the male population of the same division in more than a half of the cases, which dose not accord with a definition of a lower age of adulthood for females. Children account for over 40% of the female population in three-quarters of all divisions, and over 50% in more than a half. This high proportion of children suggests underreporting of the adult population.

In Súra-kérta, the territory of the Susuhunan, population figures by sex for adults and children are available for four clusters of districts. No remarkable difference is found between male and female: the percentage of children in the male population ranges from 40.3% to 55.4% and that in the female population from 41.3% to 55.4%. Excessively high ratios of children are also detected here.[3]

In Surabáya, the population of the town is shown by sex divided into four age-groups: a) men above fifty years of age, 1,745; b) women above fifty years, 2,680; c) men from twenty to fifty years, 5,908; d) women from twenty to fifty years, 6,841; e) men from ten to twenty years, 771; f) women from ten to twenty

3) The percentage of children depends on the definition of child. The discussion here would not hold if the age at first marriage was much higher than that assumed here on the grounds of common sense. The relatively high proportion of children among the non-cultivators may offer some aspects for reconsideration. The remarkable variation in the percentage of children among the divisions in a province may, however, suggest that particular divisions had an extremely high age at first marriage. In some cases, the percentage of children is too high even for a higher age at first marriage.

years, 540; g) male children under the age of ten years, 3,019; and h) female children under the age of ten years, 3,070. The percentage of children in the male population is 26.4, that in the female population is 23.4. The proportion of children under ten years in a stable population under the same assumptions as mentioned before ranges from 20.98% to 30.16% for males, and 20.86% to 29.01% for females, and the figures for Surabaya are within these limits. The proportion of those between 10 and 20 is 6.7% and 4.1% respectively for males and females. These extraordinarily low rates suggest the probability of their absorption into the upper and lower age-groups, especially the former, or of their overall underestimation. The cumulative percentage up to the age of fifty is 84.7% for males, and 79.6% for females. The latter would not be realized in a stable population under level 4 unless the ages of the middle aged were misreported at higher levels.

In Yúgya-kérta, the population is divided into five groups: children at the breast, children under fifteen years of age, unmarried youths of about fifteen years of age, married, and unmarried; and their numbers are shown by sex for nine districts or divisions. The cumulative percentages up to the third age-group are shown in Fig. 1. The percentage of children at the breast varies between 7.2% and 14.0% for the male population and between 7.0% and 12.4% for the female. The highest figure would mean that children remain at the breast until the age of five, if a stable population under the conditions mentioned is accepted. This duration is too long even for Javanese, among whom prolonged breast-feeding is an established custom. This implies, therefore, a relative excess of infants, or underestimation of the older population. The cumulative percent up to the unmarried youths about fifteen years of age varies between 30.8% and 50.6% for males and
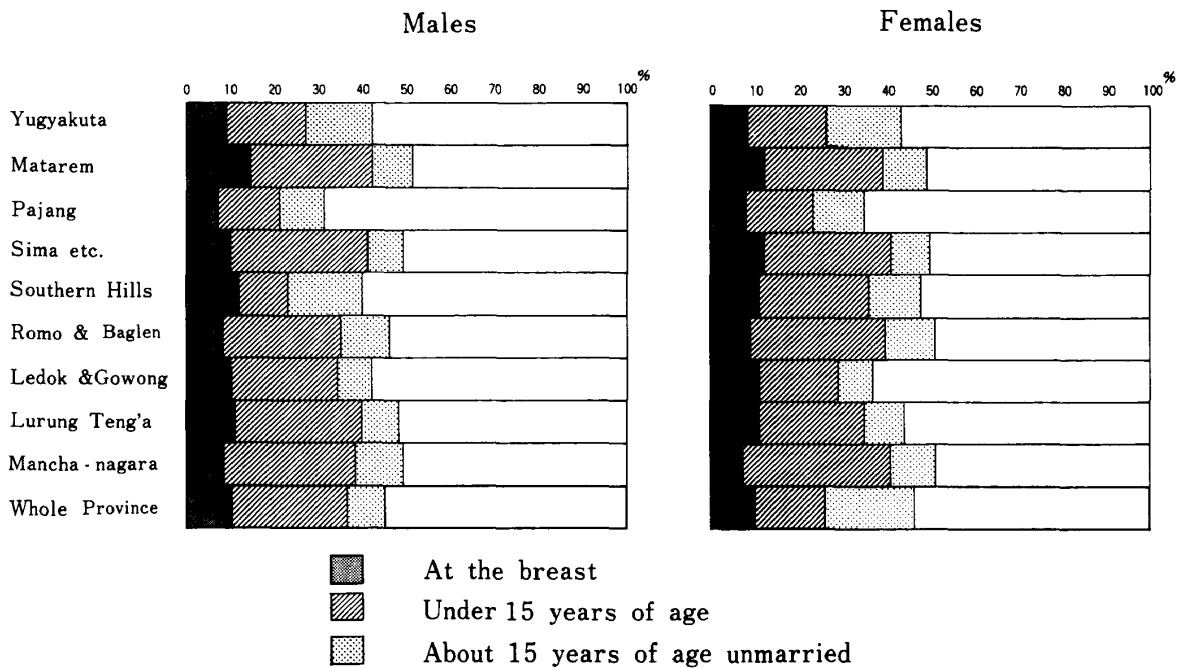
Males   Females

At the breast
Under 15 years of age
About 15 years of age unmarried

Fig. 1 Cumulative Percentages of the Population by Age Group in Each Division of Yugya-kerta

between 35.5% and 51.0% for females. For a stable population under the assumed conditions described earlier, including an average age at first marriage of fifteen years, the percentage of those under fifteen would never reach 40%; but according to the data in the provincial table, the cumulative percent exceeds this figure in seven districts or divisions out of nine. This also suggests either a relative excess of children or underestimation of the adult population, unless the age at first marriage was higher, which is unlikely. Differences between males and females in the same district (or division) are negligible, which suggests remarkable under-reporting for the adult male population, as age at marriage was probably higher for males.

John Crawfurd, who stayed in Java from 1811 to 1817, collected his own population statistics in Jogyakarta in 1814. Among them is included the population by age-group. These figures are supposed to have collected in the same district included in Raffles's provincial table under the name of Yukyakuta. Crawfurd himself was re-ported to have been critical about Raffles's description in *History of Java*, and he can be expected to have presented more reliable statistics, having been on official duty in Jogyakarta. Their figures are shown for comparison in Table 5. Crawfurd's age-groups are not necessarily the same as those of Raffles, at least in their wording. The correspondence between them is as follows: widowers and unmarried men, widows and unmarried women, unmarried lads and unmarried young men about fifteen years of age, boys not circumcised and boys under fifteen years of age, and girls whose teeth have not been filed and girls under fifteen years of age. Despite the seemingly more precise expressions adopted by Raffles, his categories can be considered practically the same as Crawfurd's. That Raffles's figures are lower can be seen most clearly for the boys, followed by married men, and unmarried young men. This fact is consistent with the general tendency so far found. Raffles's figure is less than that of Crawfurd by 5.8% for the total

Table 5　Population of Jogyakarta by Age Group as Estimated by Crawfurd and Raffles in about 1815

Crawfurd (a)		Raffles (b)		b/a
Married men	10,188	Married men	8,697	0.854
Married women	10,355	Married women	9,065	0.875
Widowers	1,479	Unmarried men	1,595	1.078
Widows	1,919	Unmarried women	2,252	1.174
Unmarried lads	2,972	Young men about 15 years of age unmarried	2,592	0.872
Unmarried girls	2,313	Young women about 15 years of age unmarried	3,255	1.407
Boys not circumcised	3.956	Boys under 15 years of age	3,225	0.815
Girls whose teeth have not been filed	3,274	Girls under 15 years of age	3,599	1,099
Male infants at the breast	1,721	Male children at the breast	1,531	1.890
Female infants at the breast	1,447	Female children at the breast	1,528	1.056
Total	39,624	Total	37,339	0.942

Sources: Crawfurd [1849] and Raffles's Provincial Table.

population, 14.6% for married men, and 12.5% for married women. This indicates remarkable underreporting for the adult population in Raffles's statistics.[4]

In Madura, the native population is divided into following categories for each division: boys, girls, young men, young women, males between 20 and 50 years (or males middle aged), females ditto (or females middle aged), males above 50 years, females ditto, priests, and chiefs. The proportion of males between 20 and 50 years in the total male population varies between 27.1% and 58.1%, while the corresponding figure for females varies between 27.3% and 62.1%. These wide variations suggest manipulation. Among the islands of Súmenap, the percentage of boys in the male population is 50.7% at Gila Raja, and percentage of girls in the female population 30.9% at Gila Ginting. The sex ratio of boys to girls is 2.76 (580/210) for the former, and 0.56 (301/170) for the latter. It is difficult to say anything definite from such figures. When the female population is examined carefully, however, age structures close to those in a stable population with high mortality and a low growth rate (below level 4, r=0.0~5.00) are found in the

western part of Madura. For the eastern part of Madura, including the smaller islands, the higher cumulative percentage of females up to 50 years and the lower cumulative percentage up to 'young women' suggest a higher growth rate on the one hand, and a lower age at marriage on the other.

V Statistics on Chinese and Others

The population of Chinese and others is given by sex in General Table II. While about a half of the figure agrees with those in the provincial tables, four provincial tables (Bantam, Batavia and Suburbs, Buitenzorg, and Priángen) give no information on Chinese etc., and seven provincial tables show some inconsistency.

For Semárang, although the figure in General Table II (1,700 persons) corresponds with that in the provincial table, the population of 20,000 in the town, which should include a considerable number of Chinese, is neglected in both tables. If the number of Chinese etc. in Semárang equals that in Surabáya, their population can be tentatively put at 2,000. If it is proportional to the population size, then it would be 1,600. For Japára and Jawána, the provincial table gives a population of 2,669 for Chinese etc., which is larger than the 2,290 given in General Table II. Conversely for Surabáya, the population of Chinese etc. in the provincial table (487, consisting of 222 males and 265 females) is much smaller than the 2,047 (1,010 males and 1,037 females) in General Table II. This difference is caused by the separation of the town in the provincial table as mentioned before. A close check of these two tables reveals that the population of Chinese etc. is estimated to be

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4) Despite their relative reliability, Crawfurd's figures may still include considerable underestimation. A comment attached to General Table II says, "The Population of Súra-kérta, the principal Native capital, is estimated at 105,000. That of Yúgya-kérta at somewhat less." The population of the capital of the territory of the Susuhunan in the provincial table is 105,102, which agrees with the above-mentioned figure. The population of Yugyakuta given by Raffles and that of Yugyakarta given by Crawfurd are 37,339 and 39,624 respectively. The relation between these figures and the one mentioned above remains unsolved.

2,000 (1,000 males and 1,000 females)[5] in General Table II and that those outside of the town are underestimated in the same table. For Súra-kérta, the difference of 4 persons between the figures in General Table II and the provincial table is probably due to a misprint in the latter. For Yúgya-kérta, the population of Chinese etc. given in the provincial table is 1,309, which is less than 2,202 in General Table II. The difference is due to exclusion in the former of the population of Pachitan, which was ceded to the British Government in 1813. Slight differences found for Bankálang and Pamakásan, and Súmenap in Madura seem to have been caused either by computational error or misprint.

The number of Chinese etc. overlooked in Raffles's computation thus amounts to between 2,419 and 2,819, including 1,600 or 2,000 in Semárang, 379 in Japára and Jawána, and 440 in Surabáya.

The number of Chinese, their descendents, and others in General Table I is bigger than that in the provincial tables for certain districts or divisions included in Semárang, Japára and Jawána, Grésik, and Pasúruan. If deliberate underreporting is assumed in these provincial tables, there is the further possibility of correcting the total Chinese population by adding 2,415 persons.

The sex ratios of natives and Chinese are compared in Table 6. For Java as a whole, the

5) 77,260 (male population in General Table II) — 76,038 (male natives in General Table II) = 1,222. 1,222−222 (population of Chinese males etc. in the provincial table, excluding residents of the town) =1,000 (Chinese males etc. in the town). Similar calculation has been done for females to get the number of Chinese females etc. in the town, which is also 1,000.

Table 6 Sex Ratio of Natives and Chinese etc. by Province

	Sex Ratio of Natives		Sex Ratio of Chinese etc.
Bantam	.941	<	1.275
Batavia	1.175	<	1.309
Buitenzorg	1.027	<	1.527
Priángen	.978	>	.915
Chéribon	.877	<	1.037
Tégal	.842	>	.840
Pakalúng' an	.847	<	1.363
Semárang	1.016	>	.955
Kedú	.981	<	1.027
Grobógan and Jípang	.906	<	1.239
Japára and Jawána	1.149	>	.964
Rémbang	.903	>	.889
Grésik	1.045	>	.916
Surabáya	1.001	>	.974
Pasúruan	.992	>	.953
Probolíng' go	.937	<	.975
Banyuwángi	1.009	<	1.085
Súra-kérta	.940	<	1.117
Yúgya-kérta	.941	<	1.200
Bankálang and Pamakásan	.990	<	1.078
Súmenap	.945	<	1.048
Java	.964	<	1.191

sex ratio for Chinese etc. is 1.191, which is higher than the 0.964 of the native population. The highest sex ratio figures for Chinese are found in Buitenzorg (1.527), Pakalúng'an (1.363), and Batavia and its suburbs (1.309). These figures are, however, much lower than those found in Southeast Asian cities in the late nineteenth century and early twentieth century, and suggest a relatively high degree of settlement. In some regions of Central and West Java, including Japára and Jawána, Rémbang, Grésik, Surabáya, and Pasúruan, the sex ratio of Chinese is even lower than that of the native population. This phenomenon is, however, suspected to be a result of intentional underreport-

ing of the male population for fear of poll tax and so on.

Final Remark

Raffles's estimate of the population of Java is a frequently cited historical statistic in spite of its suspect reliability. Plausible figures have also been estimated by backward projection without reference to these early estimates. It seems necessary to show the defects in the old statistics in order to bridge the gap between the old figures and the new ones. Raffles's statistics are principally based on reports from local colonial officers, who would presumably have sent him these underestimated figures whether or not they believed them accurate.

The underestimation can be reduced to the following components at different levels:

a. Regions missed in the report.

b. Households missed in the report.

c. Members of households missed in the report.

The examination in the present article suggests the primary importance of the last factor, which is related intrinsically to the checking of consistency, the method of analysis employed here. The probability of missed households may be suggested in limited cases where the population can be compared with other indices such as those for landholding, harvest, cattle, and farming tools. This, however, is difficult to decide definitely because of the variation in economic situation between old established villages and newly opened ones. Incomplete reporting often occurs in cities rather than in rural areas. Despite the importance of cities in ad-

ministration, authorities were less concerned about the registration of residents, and urban populations grew rapidly in Southeast Asia, especially from the nineteenth century.

Oversight of a whole district in a report might be rare, though it is not inconceivable. Such an omission would occur in the reports of expeditions rather than those of an administration. In this sense, the population of Java would have been estimated with the highest certainty for that period.

A perfect grasp of the population including infants and the aged was not in the mind of the administrators of the day. At the same time, people sought to conceal the true population of male adults. Raffes's estimate of the population of Java was equally liable to inaccuracy as other old records of population in the world.

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