

# Differences in Cause-of-Death Patterns Between the Native Dutch and Persons of Indonesian Descent in the Netherlands

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We studied differences in cause-specific mortality between highly integrated first- and second-generation Indonesians and native Dutch. We used the municipal population registers and cause-of-death registry to estimate rate ratios via Poisson regression analyses. Although overall mortality levels were similar, cause-of-death patterns varied between Indonesian migrants and native Dutch; the similar levels in overall mortality coincided with the high degree of integration of Indonesians within Dutch society. The differences in cause-of-death patterns may reflect persistent influences of country of origin and migration history. (*Am J Public Health*. 2007;97:1616–1618. doi:10.2105/AJPH.2006.086314)

Numerous studies have examined the relation between ethnicity, migration, and health status.<sup>1–3</sup> Dutch studies have focused on socioeconomically less affluent Surinamese, Turkish, Moroccan, and Antillean/Aruban migrants, for whom large mortality differentials were observed.<sup>2,4–6</sup> To our knowledge, we are the first to focus on Indonesians, who have largely integrated or even assimilated into Dutch society.<sup>7–12</sup> Approximately 126 000 Indonesians migrated to the Netherlands between 1945 and 1949 in the aftermath of World War II and the Indonesian War of Independence.<sup>13,14</sup> Indonesians have adjusted to Dutch life (e.g., language and culture) smoothly; they have similar income levels to and are employed at equal rates in the government and in the education and health care fields as the native Dutch.<sup>7–12,15</sup>

Our objective was to assess whether Indonesians' high degree of integration resulted in similar mortality levels and patterns as those of the native Dutch. Persisting mortality differences would indicate that genetic factors or persistent influences from the country of origin affect the health of migrants long after migration.

## METHODS

We compared overall and cause-specific mortality between first- and second-generation Indonesians and native Dutch. We used data from the cause-of-death registry and the municipal population registers. All Dutch inhabitants who died between 1995 and 2000 were included in our study, irrespective of whether death occurred in the Netherlands or abroad. Persons were considered to be first-generation Indonesian migrants if they and both parents were born in Indonesia and second-generation Indonesian migrants if they were born in the Netherlands but both parents were born in Indonesia. In our analyses, we excluded mixed Indo-Dutch persons and all Dutch inhabitants who were not native Dutch, except first- and second-generation Indonesians. We estimated the mortality rate ratios between Indonesians and native Dutch using Poisson regression analyses, and we controlled for 5-year age group, gender, marital status, and area-level socioeconomic status.

## RESULTS

Compared with the native Dutch, first-generation Indonesian men and women had 7% lower (rate ratio [RR]=0.93; 95% confidence interval [CI]=0.90, 0.96) and 6% higher (RR=1.06; 95% CI=1.03, 1.09) mortality rates, respectively, whereas the second-generation men and women had 9% lower (RR=0.91; 95% CI=0.81, 1.03) and 11% higher (RR=1.11; 95% CI=0.98, 1.26) mortality, respectively (Table 1). Middle-aged Indonesians had lower mortality, and the other age groups had similar mortality.

Differences in cause-specific mortality between Indonesians and the native Dutch were substantial (Table 2). First-generation Indonesians showed higher mortality rates for cardiovascular diseases, diabetes, infectious diseases, and uterine cancer. Even greater mortality differentials were observed for hepatitis, tuberculosis, liver cancer, Hodgkin's disease, and asthma. Indonesians had lower mortality rates for lung and colorectal cancer, chronic obstructive pulmonary disease, suicide, and motor injuries than did the native Dutch. Indonesians had extremely low mortality rates for stomach, skin, and oral cancer and alcohol-related diseases compared with the native Dutch. The second-generation Indonesian migrants showed more similarity to the native Dutch in mortality from hepatitis; colorectal, skin, stomach, and oral cancers; suicide; and asthma. Compared with first-generation Indonesians and native Dutch, second-generation Indonesians showed higher mortality rates from lung, liver, and uterine cancer but lower mortality rates from cardiovascular diseases.

## DISCUSSION

The "healthy migrant effect" probably does not play an important role in the cause-of-death pattern of persons of Indonesian descent in the Netherlands. On entry, Indonesians were not selected on their physical abilities for labor. Any health selection took place half a century ago; therefore, its effects must have been strongly reduced.<sup>16</sup> Moreover, the small group who came more recently to the Netherlands did not show lower mortality than did those who migrated long ago. Selective remigration of an unhealthy subsample of migrants—the "salmon bias"<sup>17</sup>—is unlikely to have had much influence

**TABLE 1—Mortality Within Different Age Groups Among Indonesian Migrant Groups Compared with the Native Dutch: the Netherlands, 1995–2000**

	First-Generation Indonesians, RR (95% CI)	Second-Generation Indonesians, RR (95% CI)	Total Indonesians, RR (95% CI)	No. of Deaths in the Total Indonesian Group
Total <sup>a</sup>	1.00 (0.98, 1.02)	1.00 (0.91, 1.09)	1.00 (0.98, 1.02)	10 423
Gender <sup>a</sup>				
Men	0.93 (0.90, 0.96)	0.91 (0.81, 1.03)	0.93 (0.90, 0.96)	4 600
Women	1.06 (1.03, 1.09)	1.11 (0.98, 1.26)	1.06 (1.03, 1.09)	5 823
Age group, y <sup>b</sup>				
20–39	0.95 (0.72, 1.27)	1.04 (0.90, 1.21)	1.02 (0.90, 1.17)	232
40–64	0.86 (0.82, 0.90)	0.90 (0.79, 1.03)	0.86 (0.82, 0.90)	1 800
≥ 65	1.00 (0.97, 1.02)	0.78 (0.64, 0.95)	0.99 (0.97, 1.01)	8 383

Note. RR = rate ratio; CI = confidence intervals. Persons were considered to be first-generation Indonesians migrants if they and both parents were born in Indonesia and second-generation Indonesian migrants if they were born in the Netherlands but both parents were born in Indonesia.

<sup>a</sup>Adjusted for age and socioeconomic status. The corresponding native Dutch group (the total, male, and female native Dutch, respectively) was used as the reference group.

<sup>b</sup>Adjusted for age, gender, socioeconomic status, and marital status. Men and women were combined. The native Dutch group, within the same age group, was used as the reference group.

because Indonesian remigration is rare in the Netherlands.

Indonesians have lower mortality rates from most neoplasms, such as cancers of the gastrointestinal tract (Table 2) compared with the native Dutch. Health-related behavior, including diet and lower prevalence rates of excessive tobacco and alcohol use, may have played a role in the lower mortality rates from most neoplasms in the Indonesian groups compared to the native Dutch. This is suggested by their lower mortality rate from alcohol-related deaths and lung cancer. Despite lower smoking rates, Indonesians had higher mortality rates from cardiovascular disease and diabetes. Genetic differences may partly explain these higher mortality rates.<sup>18–23</sup> British studies suggested that higher insulin resistance and smaller diameters of coronary arteries among South Asians play a role in the higher mortality rates from cardiovascular disease and diabetes in the Indonesian groups compared to the native Dutch.<sup>3,24–28</sup> However, genetic explanations are not supported here because the second-generation Indonesians had lower mortality rates from cardiovascular disease than did the native Dutch.

Poor living conditions in early life might have contributed to higher mortality for some diseases. Infection rates are relatively high in Indonesia. Acquired infections may persist for a lifetime.<sup>29,30</sup> For first-generation Indonesians, this could explain the higher mortality from

infections and consequently for liver cancer.<sup>31–35</sup> The second generation, who grew up in the Netherlands, showed lower mortality from hepatitis than did the first generation. Vertical transmission might explain their higher hepatitis mortality rates compared with the native Dutch. Among Indonesians, a more prominent role of social control, support, and religion could explain lower mortality rates from alcohol-related deaths and suicide compared with the native Dutch, although religion could also explain higher rates of uterine cancer.<sup>36,37</sup>

Although Indonesians have similar levels of overall mortality, cause-specific mortality patterns vary considerably between Indonesians and the native Dutch. The differences in cause-of-death rates and patterns may be a result of persisting and often favorable influences of the country of origin on their social environment and health-related behaviors. Poorer living conditions in early life may, however, have contributed to excess mortality from some diseases. Thus, even though Indonesian migrants have achieved virtually the same chances of survival as have the native Dutch, their country of origin still influences their causes of death. ■

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#### Contributors

L. Ho and A.E. Kunst conceptualized the study. L. Ho performed the analyses, interpreted the findings, and wrote the article. V. Bos prepared the longitudinal data sets. A.E. Kunst supervised the analyses and writing of the article.

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#### Human Participant Protection

No institutional review board approval was required for this study.

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**TABLE 2—Mortality Rates for Specific Causes of Death Among Indonesian Migrant Groups Compared With the Native Dutch: the Netherlands, 1995–2000**

	First-Generation Indonesians, RR <sup>a</sup> (95% CI)	Second-Generation Indonesians, RR <sup>a</sup> (95% CI)	No. of Deaths in the Total Indonesian Group (n = 10 423)
Infectious diseases	1.56 (1.33, 1.83)	1.93 (1.24, 3.00)	177
Tuberculosis	3.52 (2.39, 5.19)	0.00 (0, 0)	27
HIV	1.45 (0.81, 2.57)	1.54 (0.80, 2.99)	21
Hepatitis	6.33 (3.64, 11.01)	3.45 (0.84, 14.27)	16
Neoplasm	0.79 (0.76, 0.82)	1.07 (0.92, 1.24)	2492
Stomach cancer	0.36 (0.27, 0.47)	0.65 (0.24, 1.73)	51
Lung cancer	0.65 (0.60, 0.72)	1.21 (0.87, 1.67)	483
Breast cancer	1.02 (0.91, 1.14)	1.15 (0.81, 1.64)	315
Skin cancer	0.26 (0.14, 0.48)	0.73 (0.30, 1.75)	15
Oral cavity cancer	0.40 (0.26, 0.60)	0.52 (0.13, 2.07)	24
Liver cancer	2.30 (1.82, 2.91)	3.17 (1.31, 7.68)	78
Uterine cancer	1.75 (1.25, 2.47)	2.14 (1.01, 4.54)	41
Colorectal cancer	0.84 (0.74, 0.94)	1.00 (0.58, 1.72)	287
Hodgkin's disease	2.65 (1.55, 4.52)	3.96 (1.46, 10.74)	18
Cardiovascular diseases	1.07 (1.04, 1.10)	0.83 (0.69, 1.00)	4119
Ischemic heart disease	1.00 (0.95, 1.05)	0.87 (0.65, 1.16)	1490
Heart failure	1.07 (0.97, 1.17)	0.35 (0.11, 1.09)	449
Cerebrovascular accident	1.22 (1.15, 1.29)	1.04 (0.72, 1.50)	1134
Diabetes mellitus	1.31 (1.17, 1.47)	0.50 (0.19, 1.33)	321
Respiratory diseases	0.93 (0.87, 0.99)	0.77 (0.48, 1.22)	957
Asthma	2.96 (1.76, 4.97)	1.30 (0.18, 9.33)	16
Chronic obstructive pulmonary disease	0.80 (0.72, 0.88)	0.63 (0.28, 1.41)	400
Pneumonia and influenza	1.04 (0.95, 1.14)	0.93 (0.50, 1.74)	480
External causes	0.90 (0.79, 1.01)	0.85 (0.68, 1.05)	354
Suicide	0.57 (0.43, 0.75)	1.07 (0.81, 1.40)	105
Homicide	1.32 (0.68, 2.57)	1.39 (0.66, 2.94)	16
Alcohol poisoning	0.29 (0.19, 0.45)	0.07 (0.01, 0.49)	21
Motor injuries	0.98 (0.74, 1.31)	0.54 (0.32, 0.89)	63
Unknown	1.28 (1.18, 1.38)	1.25 (0.91, 1.70)	632

Note. RR = rate ratio. CI = confidence intervals. Persons were considered to be first-generation Indonesian migrants if they and both parents were born in Indonesia and second-generation Indonesian migrants if they were born in the Netherlands but both parents were born in Indonesia.

<sup>a</sup>Adjusted for age, gender, socioeconomic status, and marital status. Men and women were combined. The total native Dutch population was used as the reference group.

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