A comparison of migrants to, and women born in, urban Mongolia: demographic, reproductive, anthropometric and lifestyle characteristics

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Background: Mongolia has experienced vast migration from rural to urban areas since the 1950s. We hypothesized that women migrating to Ulaanbaatar, the capital, would differ in factors related to future chronic disease risk compared with women who were born in Ulaanbaatar.

Methods: Premenopausal mothers (aged <44 years) of children attending two schools (one in the city centre and one in the outskirts) in Ulaanbaatar were recruited for the study. During April and May 2009, 420 women were interviewed about migration, reproductive history and lifestyle factors and anthropometric measurements were taken.

Results: Women born in (n=178) and outside (n=242) Ulaanbaatar were similar in education and marital status, but the latter appeared to have a more traditional lifestyle including being more likely to have lived as a nomadic herder (22.3% vs 5.6%; p<0.001) and to currently live in a traditional yurt or ger (40.1% vs 29.2%). Ever-use of hormonal contraception was more common in women born outside Ulaanbaatar (52.1% vs 38.2%; p=0.005) and their age at first live birth was older (26.0% vs 20.8% for ≥25 vs <25 years). Although the number of pregnancies was similar, the number of live births was greater for those born outside Ulaanbaatar (p=0.002). Women born in Ulaanbaatar were more likely to have smoked cigarettes (24.7% vs 11.2%; p<0.001). Women born outside Ulaanbaatar were more likely to consume the traditional meat and dairy diet.

Conclusion: Rural migrants to Mongolia's capital have retained a traditional lifestyle in some, but not all, respects. Internal migrant populations may provide the opportunity to assess the effect of changes in isolated risk factors for subsequent chronic disease.

Keywords: Lifestyle, Reproductive factors, Diet, Non-communicable diseases, Mongolia, Asia

Introduction

Mongolia is a landlocked, sparsely populated country in northern Central Asia. In 2006, the population of Mongolia was estimated to be 2.6 million people. Mongolia is in the midst of a demographic transition, in which mortality and birth rates are declining, and the population is ageing. Nevertheless, Mongolia currently has a young population with 32.6% of its people <15 years old and only 3.5% >65 years old. There has been a substantial move from rural to urban residence: approximately 60% of the population lives in Ulaanbaatar (the capital), whereas in 1986, only about 25% lived in Ulaanbaatar.

In the early 1990s, the collapse of the Soviet Union and the end of Russian subsidies to Mongolia had complex and extreme economic and demographic effects.[1–4] Nomadic herders were free to decide where to live, and could move to the city in search of economic opportunity and a more urban lifestyle. A shortage of housing in Ulaanbaatar led to the explosive growth of 'ger districts', dense collections of the traditional circular, wood-framed, felt-covered, semi-portable Mongol dwellings. The ger districts were erected on the outskirts of the city, in the flat river valley and low hills. These districts lack running water, sewage systems and access to the central heating system that furnishes modern buildings in Ulaanbaatar.

The rapid rise of chronic diseases in urbanizing populations in developing countries worldwide is an issue of growing concern.[5-11] It has been postulated that changes in environmental exposure, including lifestyle factors, underlie the increases in chronic disease risk in developing countries among migrants from rural to urban areas, as well as the risk increases observed among persons migrating from lower to higher chronic disease risk countries. For example, reproductive factors such as greater parity and later age at first birth could affect subsequent breast cancer risk in migrant women. A challenge in identifying factors associated with changes in disease risk among migrants are the simultaneous lifestyle and environmental changes they undergo, making it difficult to distinguish whether lifestyle or environment drives the changes in disease risk observed with migration. Comprehensive profiles of internal migration are rare. Our data on migration within one country and ethnic group offer the opportunity to study isolated risk factors, such as smoking, even while holding other factors constant (such as childbearing). Our aim was to determine whether women who migrated to Ulaanbaatar from the countryside were different to women born in Ulaanbaatar with regard to lifestyle characteristics associated with the risk of developing chronic diseases.

Materials and methods

Study population

Mothers were recruited at two schools in Ulaanbaatar, one in the centre of the city (more affluent and urbanized) and the other in the ger districts on the outskirts of the city. One of the schools was chosen because it had been involved in an earlier study we conducted and was representative of an area of Ulaanbaatar in which there would be a high percentage of in-migrants. Because the mothers of the children had agreed to participate in the earlier study, we were confident of a high response rate among the mothers to our subsequent study. To make the groups comparable, we identified another school in central Ulaanbaatar which was more affluent and likely to be comprised of families who had lived in Ulaanbaatar longer, and thus mothers who were born in Ulaanbaatar. We identified schools as the recruitment sites because they allowed a central location for data collection, and the schools' clinics serve the neighbourhood community as well as the students so it was relatively comfortable for the women to have their blood drawn and anthropometric measurements taken. Written, informed consent was obtained from all participants.

Data were collected in April and May 2009. Mothers of children attending grades 1–4, who were <44 years old, and who were not pregnant or breastfeeding were eligible. All of the invited women agreed to participate. Data from 420 women, 199 from the school on the city's outskirts, and 221 from the school in the centre of the city, were available for study. Participants were interviewed about demographics, migration, medical history, reproductive history, physical activity, diet, smoking and alcohol consumption. Specific information was obtained regarding place of birth and lifetime migration experience. Leisure and work-based physical activity was assessed with the Global Physical Activity Questionnaire developed by the WHO to survey the intensity and total amount of exercise to categorize activity intensity as low, moderate or high. The questionnaire collects information on physical activity participation and in three settings (or domains): activity at work, travel to and from places and recreational activities. This instrument has been shown to be valid and reliable, and adaptable to different populations by incorporating cultural differences.[12] Participants were asked about frequency of 'vigorous-intensity activities', defined as requiring hard physical effort and causing large increases in breathing or heart rate, and 'moderate-intensity activities', defined as requiring moderate physical effort and causing small increases in breathing or heart rate. A short food frequency questionnaire was developed by one of the authors (GD) to assess usual dietary intake. Participants were asked for a list of traditional and modern Mongolian foods, 'in the past week, how many times did you eat . . . ?' and provided with seven response categories (never/less than once per month; 1–3 per month; once per week; 2–4 per week; 5–6 per week; once a day; 2 or more per day).

Standard anthropometric measurements were taken by trained personnel. Participants were weighed using standard double-beam scales available at the school clinic and height was measured with the women standing shoeless with their backs against a vertical surface using a level, right-angled rod brought to the crown of the head. Waist circumference was measured at the midpoint between the bottom rib and the top of iliac crest.

Statistical analysis

The χ^2 test was used to evaluate differences between women born in and outside Ulaanbaatar; the Mantel–Haenszel χ^2 for ordinal variables and the likelihood ratio test for categorical variables. Means were calculated for continuous variables, which were compared using Student's t-test statistic. Logistic regression with an outcome variable comparing urban-born with rural-born women included age and several health and lifestyle risk factors that differed between groups in the univariable analyses. Missing data were categorized separately.

Results

One hundred and seventy-four (40%) of the women were born in Ulaanbaatar, 5 (2%) in Darkhan city, and the rest were born in different aimags (provinces) of 114 various soums (districts) of Mongolia. Among those who were born outside Ulaanbaatar, 32 (7%) were born in Uvurkhangai, 31 (7%) in Gobi-Altai, 30 (7%) in Zavhan, 27 (6%) in Tuv aimag, 21 (5%) in Arkhangai aimag and the remainder in the remaining aimags except for two (Gobi-Sumber and Orkhon).

Women born in Ulaanbaatar were slightly younger than those born outside Ulaanbaatar (mean±SD: age 33.9±5.2 years and 35.1±5.3 years, respectively; p=0.006). Adjustment for age did not change any of the comparisons of other factors between groups. Attained education and marital status were similar (Table 1). Women born in Ulaanbaatar had lived in the city longer (mean±SD: 20.5±13.4 years) than women who were born in rural areas (mean±SD: 11.1±8.4 years).

In general, being born in Ulaanbaatar was associated with characteristics indicative of a less traditional lifestyle than being born outside Ulaanbaatar. Women born in Ulaanbaatar were more likely to live in an apartment and less likely to live in a ger. In addition, they were less likely to have lived as nomadic herders and to have spent summers in the countryside during childhood.

Table 1. Demographic characteristics of 420 premenopausal Mongolian women (aged <44 years) born in and outside Ulaanbaatar (UB) and interviewed during April and May 2009

Characteristic	Born in UB (n=178) n (%)	Born outside UB (n=242) n (%)	p value[a]
Age (years)			0.006
<30	37 (20.8)	30 (12.4)	
30–34	71 (39.9)	87 (36.0)	
35–39	43 (24.2)	73 (30.2)	
≥40	27 (15.2)	52 (21.5)	
Education			NS
Some high school	65 (36.4)	88 (36.5)	
Graduated high school	30 (16.9)	45 (18.6)	
Some college	70 (39.3)	82 (33.9)	
Graduated college	13 (7.3)	27 (11.2)	
Marital status			NS
Single	4 (2.3)	4 (1.7)	
Married	147 (82.6)	212 (87.6)	
Divorced or separated	20 (11.2)	21 (8.7)	
Widowed	7 (3.9)	5 (2.1)	
House type			0.010
Ger[b]	52 (29.2)	97 (40.1)	
Apartment	65 (36.5)	55 (22.7)	
House	61 (34.3)	90 (37.2)	
Lived before current address			<0.001
In the city	163 (91.6)	110 (45.6)	
In the country	15 (8.4)	131 (54.4)	
Previously lived as nomad	10 (5.6)	54 (22.3)	<0.001
Own or drive car	92 (51.7)	103 (42.6)	NS
Spent summer in countryside as child	118 (66.3)	194 (80.2)	0.001
Spend summer in countryside now	114 (64.0)	129 (53.3)	0.028
Family owned television as child	162 (91.0)	183 (75.6)	<0.001

NS: not significant.
[a] The p value refers to the overall comparison among categories except for variables that are ordinal (age and education).
[b] Traditional circular, wood-framed, felt-covered, semi-portable Mongol dwelling.

However, women born in Ulaanbaatar were now more likely to spend summers in the countryside, an increasingly common custom among Ulaanbaatar dwellers. The families of women born in Ulaanbaatar were more likely to have owned a television during their childhood. Owning or driving a car was slightly more common among women born in Ulaanbaatar, although this difference did not reach statistical significance. Women born outside Ulaanbaatar were more likely to be unemployed (27.5%) than those born in Ulaanbaatar (21.1%) but the proportions employed in professional (41.7% vs 39.3%, respectively) positions were similar between the two groups.

Table 2 presents the reproductive characteristics of the women. Age at menarche was similar among women born in and outside Ulaanbaatar. Ever-use of hormonal contraception was more likely among women born outside Ulaanbaatar than in Ulaanbaatar, although similar proportions were currently using it. Infertility was 10% (18/178) or less in both groups. Despite a similar number of total pregnancies, women born in Ulaanbaatar had a lower number of live births than women born in the countryside. This may have been due to a higher prevalence of miscarriages and induced abortions among the women born in Ulaanbaatar, although the differences in these factors separately between the groups were not statistically significant. Age at first birth was slightly younger in women born in Ulaanbaatar. There was no difference between urban-born and rural-born women in the weight of the heaviest baby to which they had given birth. Breastfeeding was virtually universal among women born in the city or outside the city. The mean age at weaning was 19.3 months for urban-born and 20.1 months for rural-born women. The total number of months a woman had spent breastfeeding was statistically significantly higher among women born outside Ulaanbaatar (44.1 months for rural-born vs 36.6 months for urban-born; p=0.014), which was expected given their higher parity.

The participants' own recalled birth weight did not differ between groups (3395 g for urban-born vs 3421 g for rural-born; p=0.65). Weight at age 18 years, measured weight, BMI and

Table 2. Reproductive characteristics of 420 premenopausal Mongolian women (aged <44 years) born in and outside Ulaanbaatar (UB) and interviewed during April and May 2009

Characteristic	Born in UB (n=178) n (%)	Not born in UB (n=242) n (%)	p value[a]
Age at menarche (years)			NS
<14	36 (20.2)	45 (18.6)	
14	50 (28.1)	53 (21.9)	
15	35 (19.7)	62 (25.6)	
16	43 (24.2)	54 (22.3)	
≥17	14 (7.9)	28 (11.6)	
Ever-use of hormonal contraception	68 (38.2)	126 (52.1)	0.005
Current use of hormonal contraception	41 (23.0)	65 (27.0)	NS
Tried to become pregnant for 12 months without success	18 (10.2)	19 (7.9)	NS
No. of pregnancies			NS
1	26 (14.6)	19 (7.9)	
2	39 (21.9)	57 (23.6)	
3	39 (21.9)	63 (26.0)	
4	31 (17.4)	46 (19.0)	
≥5	43 (24.2)	57 (23.6)	
No. of live births			0.002
1	57 (32.0)	53 (21.9)	
2	78 (43.8)	105 (43.4)	
3	34 (19.1)	54 (22.3)	
≥4	9 (5.1)	30 (12.4)	
Ever miscarried	31 (17.4)	36 (14.9)	NS
No. of induced abortions			NS
0	79 (44.4)	111 (45.9)	
1	42 (23.6)	73 (30.2)	
≥2	57 (32.0)	58 (24.0)	
Age at first live birth (years)			0.019
<21	64 (36.0)	60 (24.8)	
21–24	77 (43.3)	119 (49.2)	
≥25	37 (20.8)	63 (26.0)	
Ever breastfed	177 (99.4)	239 (99.2)	NS
Total no. of months breastfed			0.061
1–23	61 (35.1)	66 (28.0)	
24–47	56 (32.2)	73 (30.9)	
≥48	57 (32.8)	97 (41.1)	
Missing data (n)	3	3	
Average no. of months breastfed each child			NS
<12	53 (28.0)	66 (28.0)	
12–23	65 (37.4)	80 (33.9)	
≥24	56 (32.2)	90 (38.1)	
Weight of heaviest baby (g)			NS
≤3250	67 (37.6)	74 (30.6)	
3251–3600	50 (28.1)	98 (40.5)	
>3600	62 (34.3)	70 (28.9)	

NS: not significant.
[a] The p value refers to the overall comparison among categories except for variables that are ordinal (age at menarche, no. of pregnancies, no. of live births, no. of induced abortions, age at first live birth, no. of months breastfed, average no. of months breastfed, weight of heaviest baby).

waist circumference were not statistically significantly different, although the women born outside Ulaanbaatar were slightly less tall than those born in Ulaanbaatar (Table 3).

Less than 25% of women in either group reported currently consuming alcohol. The percentage who reported ever smoking was twice as high among those born in Ulaanbaatar (24.7%, 44/178)

Table 3. Lifestyle characteristics and medical history of 420 premenopausal Mongolian women (aged <44 years) born in and outside Ulaanbaatar (UB) and interviewed during April and May 2009

Characteristic	Born in UB (n=178) n (%)	Born outside UB (n=242) n (%)	p value[a]
Weight (kg) at age 18 years			NS
30–49	55 (30.9)	72 (29.9)	
50–57	61 (34.3)	85 (35.3)	
58–83	62 (34.8)	84 (34.9)	
Missing data	0	1	
Weight (kg) tertiles			NS
35.8–55.9	58 (32.6)	83 (34.3)	
56.0–65.9	57 (32.0)	82 (33.9)	
66.0–119.1	63 (35.4)	77 (31.8)	
Height (cm) tertiles			0.053
138.6–154.9	49 (27.5)	91 (37.6)	
155.0–159.5	64 (36.0)	76 (31.4)	
159.6–172.7	65 (36.5)	75 (31.0)	
Body mass index (kg/m^2)			NS
<26	101 (56.7)	129 (53.3)	
26–<30	51 (28.7)	83 (34.3)	
≥30	26 (14.6)	30 (12.4)	
Waist circumference (cm) tertiles			NS
56.0–74.9	56 (31.5)	79 (32.6)	
75.0–85.9	58 (32.6)	86 (35.5)	
86.0–121.0	64 (36.0)	77 (31.8)	
Ever smoked	44 (24.7)	27 (11.2)	<0.001
Age began smoking (years)			NS
<25	21 (52.5)	9 (40.9)	
≥25	19 (47.5)	13 (59.1)	
Missing data (n)	4	5	
Currently consume alcohol	41 (23.0)	53 (21.9)	NS
Physical activity level			NS
Low	31 (17.5)	39 (16.2)	
Moderate	37 (20.9)	57 (23.7)	
Vigorous	109 (61.6)	145 (60.2)	

NS: not significant.
[a] The p value refers to the overall comparison among categories except for variables that are ordinal (weight at age 18 years, weight, height, body mass index, waist circumference, physical activity level).

than those born outside Ulaanbaatar (11.2%, 27/242). Estimated physical activity, based on work and leisure time reports of intensity, was similar between those born in (17.5%, 31/178 and 61.6%, 109/178 for low and high levels, respectively) and outside Ulaanbaatar (16.2%, 39/242 and 60.2%, 145/242 for low and high levels, respectively). This was also true for work and leisure time activities when assessed separately (data not shown). Family history of breast cancer was very low (2.8%, 5/178 and 1.7%, 4/242) in both groups of women.

Logistic regression analysis was used to simultaneously assess differences in several of the reproductive (oral contraceptive use, number of live births, age at first live birth) and lifestyle variables (smoking) that were significant in the univariable comparisons with adjustment for age. The multivariable ORs did not differ significantly from univariable ORs (data not shown in tables) with less oral contraceptive use in women born in Ulaanbaatar (OR=0.49, 95% CI 0.32–0.74), fewer live births (OR for ≥4 vs 1 live birth= 0.24, 95% CI 0.09–0.64), younger age at first live birth (OR for ≥25 years vs ≤20 years=0.53, 95% CI 0.29–0.99) and more smoking (OR=2.5, 95% CI 1.5–4.4) compared with women born outside Ulaanbaatar.

Table 4 presents results on dietary intake. There was no difference in total meat consumption between the two groups, though urban-born women ate less goat meat and more pork. Urban-born women also ate more eggs. Women born in Ulaanbaatar ate a less traditional diet with fewer dairy products like eezgii (roasted dairy product made from boiling milk with a little yogurt) and aaruul (dried curd made from Mongolian traditional yogurt). Women born in Ulaanbaatar drank significantly more cow's milk, including imported milk and locally produced boiled cow's milk. Certain vegetables (potatoes, cabbage) and fruits (wild berries, apples, bananas, fruit juice) were consumed more often by women born in Ulaanbaatar compared with women born in the countryside. There were no differences in the intake of rice or flour products between the two groups, but women born in Ulaanbaatar tended to consume more processed foods (i.e. potato chips, cakes, pies) and sugar-sweetened drinks compared with women who were born in the countryside. Use of dietary supplements was similar between groups.

Discussion

In our study, as expected, being born in Ulaanbaatar was generally associated with characteristics indicative of a less traditional lifestyle and diet than being born outside Ulaanbaatar. Gers are erected wherever there is space, as land ownership was not part of the Mongolian legal code. The concept of land ownership developed in the city, and as the economic conditions of new migrants improve, they move to better gers closer in, and then to newly constructed apartments. Thus, in our study, we were not surprised to find that women born in Ulaanbaatar were more likely to live in apartments than gers. Women who migrated to Ulaanbaatar were more likely to have been a nomad, and their families were less likely to have owned a television or car during their childhood than women born in Ulaanbaatar.

There are some limitations to our data, for example, the sample of 420 women may not be representative of all premenopausal women in Ulaanbaatar. Also, we cannot infer the characteristics of rural women from this survey, as the factors that would cause a woman to migrate to the city are likely to be associated with other lifestyle choices. For example, the older age at first birth of women born outside Ulaanbaatar than women born in Ulaanbaatar may reflect a reluctance or inability of young mothers in the countryside to move to Ulaanbaatar (or a postponing of childbirth among women anticipating migration), rather than a rural-urban difference in age at first birth. In a study of breast cancer in Asian migrants to the US, age at first birth was slightly older (26.6 years) in Asian women who were born in the USA, and

Table 4. Dietary intake (mean servings per day) of 420 premenopausal Mongolian women (aged <44 years) born in and outside Ulaanbaatar (UB) and interviewed during April and May 2009

Food group or item	Born in UB (n=178)	Born outside UB (n=242)	p value[a]
Animal meat and eggs			
Goat	0.16	0.24	0.035
Pork	0.06	0.04	0.065
Eggs	0.35	0.27	0.024
Total servings/day	1.99	1.92	
Dairy produce			
Mongolian (unpasteurized) milk	0.28	0.16	0.001
Aaruul (dried curd made from Mongolian traditional yogurt)	0.23	0.36	0.005
Eezgii (roasted dairy product made from boiling milk with a little yogurt)	0.07	0.13	0.004
Butter (commercial)	0.70	0.57	0.048
Vegetables			
Potato	1.07	0.94	0.032
Cabbage	0.87	0.75	0.046
Candy, dessert and bake			
Potato chips	0.18	0.11	0.015
Fruit			
Wild berry	0.12	0.05	0.054
Apple	0.34	0.27	0.066
Banana	0.15	0.11	0.051
Watermelon	0.10	0.07	0.065
Drink, juice and tea (cups)			
Soda	0.20	0.13	0.011
Fruit juice	0.30	0.21	0.012
Fruit drink	0.28	0.18	0.007
Water	1.22	1.03	0.011

[a] Only statistically significant results are included in the table.

the proportion that were nulliparous was slightly higher (15.3% vs 13.8%, respectively).[13] The time span during which urban-born women lived outside Ulaanbaatar is a reflection of the migration flux between urban and rural areas. Nevertheless, even using this crude indicator of migration status (whether the women were born in or outside Ulaanbaatar), we observed significant differences in reproduction, smoking and dietary intake among the groups despite their similar levels of education and marital status.

Mongolia's diet is unusual for a developing country, in that it consists mainly of meat and dairy products. Both groups of women consumed animal meat with equal frequency, but the rural-born women were more likely to eat goat meat which is cheaper than beef or mutton. Both groups consumed dairy products to about the same extent, but the rural-born women were more likely to use unpasteurized (Mongolian) milk, and numerous dried cheeses and other dairy products, which are made in the countryside and preserved for year-round use by fermentation and drying. Local vegetable production is just beginning in Mongolia and vegetables are still relatively scarce; potatoes and cabbage were slightly more commonly consumed by the women born in Ulaanbaatar. Women born outside Ulaanbaatar were less likely to have consumed processed and, in many cases, imported foods such as potato chips and soda. Large supermarkets and fast food restaurants are more widely available in the centre of Ulaanbaatar whereas the markets in the outskirts are small and limited. Despite the increased consumption of processed foods, there were no differences in weight or waist circumference in the two groups of women. The Mongolian STEPS Survey is a nationwide cross-sectional survey of 15–64-year-olds that was conducted in Ulaanbaatar and other provinces/aimags in September and October 2005.[14] The survey also showed greater fruit and vegetable intake in urban than rural areas.[14]

Traditional Mongolian life involves a great deal of rigorous physical activity. Women, in addition to herding, perform most of the food preparation and home food processing, washing and child-care. They also are responsible for transporting water for home use and gathering dung and small brush for fuel. Because vehicles are limited, the routines of daily life necessitate frequent walking. Indeed, the STEPS Survey[14] found that physical activity related to work was greater in rural than in urban dwellers, but physical activity for recreational purposes was higher in urbanites. Our data suggest that once Mongolian women migrate to a ger district in urban areas, their overall physical activity is similar to women living in the urban centre.

Mongolia is known internationally for high levels of alcohol consumption among men.[15] Women traditionally disapprove of male drinking, since they are often the victims of its negative consequences,[16] which may explain why so few women in our study consume alcohol or, possibly, why they were less likely to report it. The STEPS Survey conducted 5 years before our data collection found that 57%, or over twice the percentage in our study, reported consuming alcohol in the past year.[14] In contrast, smoking is considered modern and sophisticated by Mongol women. Indeed, the urban-born women were about twice as likely to be smokers as the rural-born women. The STEPS Survey[14] showed a slightly lower proportion of current smokers overall in urban areas (7.4%) than our results for ever smoking (25% for those born in Ulaanbaatar, 11% for those born outside Ulaanbaatar), although the STEPS data reflect prevalence 5 years earlier than ours and smoking may be increasing. In the STEPS Survey, smoking prevalence was greater in urban than rural areas.

Migrants from less developed to more developed countries tend to adopt the new country's chronic disease risks. A similar phenomenon occurs with migration from rural to urban areas within developing countries.[17] Study of populations in transition with associated differences in disease risk provides the opportunity to identify the environmental and lifestyle factors that are responsible. Some of these risk factors are known. Differences in factors such as smoking, which was more prevalent in women born in Ulaanbaatar, may predict future increases in cardiovascular disease, diabetes and cancer, as could the more calorie dense but nutritionally empty processed foods consumed in higher

quantity by the these women. The latter effects might be expected to act through increases in weight, but differences in weight were not observed in our data.

Identifying factors associated with changes in disease risk among migrants from Asia to the west is challenging given the high correlation among lifestyle and environmental factors, all of which change with migration to become more similar to the host population. Our data show, however, that internally migrating populations may have different patterns of risk factors, with life-style changes being more selective and less dramatic. For example, dietary patterns differed between women born in Ulaan-baatar and those who moved there, but other factors such as BMI were similar. This could create opportunities to assess the separate effects of factors that are otherwise highly correlated leading to identification of exposures that are responsible for inter-national variation in disease risk. Intensive study of sociodemo-graphic, reproductive, environmental and lifestyle factors may provide that insight.

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