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CLINICAL ARTICLE

Pregnancy and perinatal health in Inner Mongolia, China, 1996–1999 ☆

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Abstract

Objective: To obtain descriptive measures of maternal and perinatal health in the Ba Men Region of Inner Mongolia, China. *Methods:* Data collected from the Examination Chart for Pregnant Women for approximately 22,000 pregnancies in a three-county area of Inner Mongolia, China from December 1, 1996 through December 31, 1999 were analyzed for maternal, perinatal, and neonatal outcomes. *Results:* Compared to selected developing countries, a higher percentage of women (99%) in this region received at least one prenatal care visit. This region was also characterized by a low percentage of low birthweight (<2.5 kg) infants (1%) and neonatal mortality rate (5 deaths per 1000 live births). *Conclusions:* Maternal and neonatal health outcomes in this region of Inner Mongolia were better than those in selected developing countries. Published by Elsevier Ireland Ltd. on behalf of International Federation of Gynecology and Obstetrics.

1. Introduction

Maternal and perinatal health outcomes are important measures in assessing the overall health of a nation as well as that of sub-groups within a nation. Comprehensive information about maternal and perinatal health is readily available for many developed countries. On the other hand, developing countries often do not have the infrastructure and resources to systematically collect and report data for these important measures. Data that are collected are often unreliable because of inaccurate data collection practices

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and the lack of systematic procedures across various regions of the country. These factors limit the ability of policy makers and public health researchers to adequately evaluate maternal and infant health, and to design and target interventions as needed.

Inner Mongolia, China, is an autonomous region in northern China. Bayingnormen (Ba Men) is one of eight regions in Inner Mongolia and is located in western Inner Mongolia, near the Huang He River. Residents of Ba Men are under the jurisdiction of Chinese laws and customs. One such law, China's one-child policy, is somewhat relaxed in this region so that farming couples can attempt to have at least one male child to help on the farm. However, couples in this area are still required to request permission for a reproductive permit and once pregnancy occurs, to have scheduled prenatal as well as postnatal visits. Maternal and newborn health information is recorded during these visits. This paper summarizes data collected during the routine prenatal care, delivery, and postnatal visits in three counties of Ba Men, Inner Mongolia, China, and provides a source of perinatal health measures for this region.

2. Materials and methods

With China's one-child policy, every married couple is monitored through a premarital application and reproductive permit system, which is implemented by a variety of public health workers and nurses. Once a couple's reproductive permit is approved, they receive monthly home visits from a nurse to determine if they have conceived. Upon verification of conception, an "Examination Chart for Pregnant Women" (ECPW) is initiated. The ECPW contains information from the prenatal and perinatal periods, and up to 42 days postnatally in accordance with standardized procedures with trained personnel. The ECPW is recorded on paper forms and includes information about the woman's medical and reproductive history (gravidity, parity, hereditary disease, medical diseases); general physical examination (at each of the prenatal visits, delivery, and postnatal visits); indicators of high-risk pregnancy (e.g. viral infections, drugs taken, and other exposures during pregnancy); gestational age at delivery; mode of delivery; obstetric complications; newborn conditions (sex, length, weight, infection, stillborn, BCG (bacilli Calmette-Guérin) vaccination, birth defects); maternal condition postpartum; and newborn condition 28 and 42 days postpartum (based on postpartum examinations).

Between February 2001 and February 2002, information from paper ECPW forms was collected and converted into an electronic database for the Linhe, Wuyuan, and Hanggin Houqi counties of the Ba Men region (hereafter collectively referred to as Ba Men). These three counties were chosen because of the possible exposure of the residents to drinking water arsenic; future analyses will explore this issue. Briefly, a data collection team visited every local health clinic within the three-county study area to copy all of the ECPW forms available for the years 1996, 1997, 1998, and 1999 — approximately 22,000 pregnancies in total. The copied forms were taken to a central processing facility in which each record was double data entered using specially designed software to minimize out-of-range and questionable values. Any deviations noted in data entry were validated with the paper records in China, to determine the type of error and make appropriate corrections to the final database.

The ECPW database was also examined for other errors in data entry, inconsistencies, and outliers. Of the original 23,902 records in the database, 1163 were identified as duplicates and removed from the data file. Records for pregnancies known to be associated with multiple births ($n=90$) were excluded from this analysis, as were records with missing or unusual delivery dates ($n=484$), and dates outside the time period of interest ($n=115$). This analysis was based on 22,050 singleton pregnancies with delivery dates between December 1, 1996 and December 31, 1999.

Biologically impossible data values and highly improbable values in the analysis variables were removed ($n=724$). When the correct data values could be determined or imputed with confidence, they were inserted in place of the erroneous data ($n=513$). This data cleaning generally affected less than 1% of the values in any one of the analysis variables. For most variables, less than 3% of the observations were missing.

Select maternal and newborn health outcomes from the ECPW database were compared to data from China as a whole, and to countries with high drinking water arsenic concentrations (i.e. Bangladesh and Chile) or with similar geographic or economic characteristics. Published tables and reports by UNICEF [1,2], the World Health Organization (WHO) [3], and the State of the World's Newborns report [4] served as the primary resources for maternal and newborn health indicators. UNICEF reports neonatal health statistics for approximately 200 countries, including percent low birthweight, infant mortality rate, rates of breastfeeding, and immunization rates. Country-specific neonatal mortality and stillbirth rates were also examined using Neonatal and Perinatal Mortality: Country, Regional and Global Estimates, published by WHO [3]. State of the World's Newborns is a report compiled by Save the Children and encompasses newborn health statistics on countries around the world from a number of sources, including the Demographic and Health Surveys [5], and nationally reported data from countries with vital registries with over 90% coverage.

3. Results

3.1. Ba Men, Inner Mongolia population

Table 1 presents the maternal characteristics of the women represented in the ECPW database. The mean maternal age was 25.4 years (±2.6 years) with a very low percentage of pregnant teenagers (0.1%). Approximately 80% of the women in the Ba Men study population were primigravid. Of the women reporting at least one prior pregnancy (≈20%), 6% reported at least one previous induced abortion, and 10% reported at least one previous spontaneous abortion (data not shown). Only 17.8% of the women had a prior live birth. The mean number of prenatal care visits was 5 (±1 visit). Approximately 74% of the women had at least one prenatal care visit during the first trimester, 91% during the second trimester, and increasing to almost 99% in the third trimester (data not shown). Over 95% of the deliveries were achieved with vaginal labor; 4% of the deliveries were via cesarean delivery.

Table 1 also provides the birth and neonatal outcomes from the ECPW database. Overall, about 3% of deliveries were preterm (<37 weeks of gestation completed) and 1% of infants were low birthweight (<2.5 kg). The mean