Health of Children Adopted From Guatemala: Comparison of Orphanage and Foster Care

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ABSTRACT. Objective. Since 1986, American parents have adopted >17 300 children from Guatemala. This study assessed the health, growth, and developmental status of 103 Guatemalan adopted children (48 girls; 55 boys) after arrival in the United States. Physical evidence suggestive of prenatal alcohol exposure and adequacy of vaccinations administered were also reviewed.

Methods. Retrospective chart review was conducted of 103 children who were evaluated after arrival in the United States in an international adoption specialty clinic, and a case-matched study was conducted of a subgroup of 50 children who resided in either an orphanage or foster care before adoption. Mean age at arrival was 16 ± 19 months. Before adoption, 25 children resided in orphanages, 56 resided in foster care, and 22 resided in mixed-care settings. The 25 children who had resided in orphanages before adoption were matched for age at arrival, interval from arrival to clinic visit, and gender with a child adopted from foster care. Health and developmental status of these matched pairs were compared, allowing the first direct comparison of children raised in orphanages or foster care before adoption.

Results. Mild growth delays were frequent among the children. Mean z scores for weight, height, and head circumference were, respectively, −1.00, −1.04, and −1.08. Children from foster care had significantly better z scores for height, weight, and head circumference than those from orphanage or mixed care. Among children who were younger than 2 years at arrival, growth measurements correlated inversely with age at arrival. Infectious diseases included intestinal parasites (8%) and latent tuberculosis infection (7%). Other medical conditions included anemia (30%), elevated lead levels (3%), and (using strict criteria) phenotypic facial features suggestive of prenatal alcohol exposure (28%). Adequacy of vaccine records from Guatemala was assessed: 28% met American Academy of Pediatrics standards for vaccine administration. Unsuspected significant medical diagnoses, including congenital anomalies and ocular, neurolologic, and orthopedic problems, were found in 14%. Most children were doing well developmentally (80–92% of expected performance), but 14% had global developmental delays. Cognition, expressive and receptive language, and activities of daily living skills correlated inversely with age at arrival for children who were younger than 2 years at adoption. Among the 50 matched children, those who resided in foster care before adoption had better measurements for height, weight, and head circumference at arrival to the United States. Moreover, those who resided in foster care scored significantly better for cognitive skills than those who had previously resided in orphanages (96.3% of age-expected compared with 88.3% of age-expected); other skills did not differ between the 2 groups. No differences were found between the 2 groups of children related to prevalence of medical diagnoses or phenotypic evidence suggesting prenatal alcohol exposure.

Conclusions. Guatemalan adoptees display similar overall patterns of growth and developmental delays as seen in other groups of internationally adopted children, although not as severe. Younger children had better growth and development (cognition, language, and activities of daily living skills) than older children, regardless of location of residence before adoption. Among children who were matched for age, gender, and interval from adoption to evaluation, those who had resided in foster care had better growth and cognitive scores than children who had resided in orphanages before adoption. These findings support the need for timely adoptive placement of young infants and support the placement of children in attentive foster care rather than orphanages when feasible. Pediatrics 2005;115:e710–e717. URL: www.pediatrics.org/cgi/doi/10.1542/peds.2004-2359; international adoption, orphanage, foster care, Guatemala.

A doption of children from other nations has significantly increased in the past 2 decades. Since 1986, >230 000 children have been adopted from other countries by American parents.1 More than 17 300 of these children arrived from Guatemala; all indications suggest that this number will continue to increase. Guatemala has been among the top 5 birth countries for internationally adopted children arriving in the United States since 1992. Adoptive parents often select Guatemala because of the availability of young infants and because many children reside in foster care before adoption. Some children, however, reside in orphanages before adoptive placement. Little is known about the quality of care provided in either of these settings. The health of Guatemalan children after arrival in the United States has not been evaluated comprehensively. Adoptive parents, adoption agencies, and physicians who care for internationally adopted children have wondered whether the young age at placement and residence in foster care (rather than orphanages) reduce the frequency of health and developmental issues such as those described in children who are adopted from Russia, Romania, China,
and other countries. Other speculations include the possibility that Guatemalan children are less likely to be exposed prenatally to drugs or alcohol than children from other regions and that their vaccine records are more “believable” than those from some other countries. Moreover, although foster care is widely believed to result in better health and developmental status for children without parents, a direct comparison of the status of children who are raised by these 2 methods of care has not previously been reported. Therefore, we reviewed the health and developmental status of children who were adopted from Guatemala and were evaluated in our International Adoption Clinic. We assessed their vaccine records for completeness for age and assessed each child for phenotypic evidence suggestive of prenatal alcohol exposure. Furthermore, we took advantage of the unusual circumstance of children who were adopted from the same country at comparable ages from either orphanages or foster care to compare their health and developmental status at arrival to the United States.

METHODS

Between April 1988 and May 2004, the International Adoption Clinic at the Floating Hospital for Children evaluated 2157 new patients. Of these, 103 were adopted from Guatemala by 89 families and are the subject of this survey. This retrospective chart review was approved by the Human Investigation Review Committee of the New England Medical Center. All children were self-referred to the clinic by their families or primary pediatricians; most were seen soon after arrival into the United States. All patients were assessed by a developmental therapist and a pediatrician who were experienced in international adoption and had the complete medical evaluation recommended for internationally adoptees.

Routine evaluation included a complete history and physical examination by a pediatrician. Supine length (0–24 months of age) or standing height (>2 years), weight, and head circumference were measured. Physical examination included determination of 4-digit diagnostic code for fetal alcohol spectrum disorders, although this test has not been standardized in Guatemalan children. This method uses a 5-point Likert scale to score appearance (Calabasas, CA). For comparing children who were adopted from foster care with those who were adopted from orphanages, each of the 25 children who were adopted from orphanages was matched for age at arrival, interval from arrival to clinic visit, and gender with a child who was adopted from foster care. Results of growth measurements, health assessments, and developmental status then were compared by paired t tests.

RESULTS

Subjects

Foster and orphanage care placements were defined as the setting in which the child resided after 1 month of age until adoption. Slightly more than half of the children (n = 56 [54%]) resided in foster homes before adoption. Twenty-five (24%) children were placed into orphanage care before adoption. Some children (n = 22 [21%]) lived in mixed-care settings before adoption, which included various combinations of living with the birth family, in foster care, and/or in orphanage care. Twenty resided with birth relatives (mother, grandmother) for periods ranging from 1 month to 5 years (mean: 21.5 ± 20.23; range: 1–60 months). Of these children, 13 then were placed into orphanage care, and the remaining 7 were placed into foster care (including 1 who resided in different foster homes before adoption). Of the remaining 2 children with mixed care before adoption, details of placements were not completely known.

There was no difference in the ratio of boys to girls...
in any of the 3 groups or in the time interval after
arrival to the first clinic visit. However, the age at
arrival varied depending on location of residence
before adoption (P < .001). Children who were
adopted from foster care arrived at 7.1 ± 0.37
months, whereas those from orphanages arrived at
12.6 ± 2.3 months and those from mixed care arrived at
42.2 ± 5.4 months.

Growth
On arrival, z scores for weight ranged from −4.66
to 1.75 (mean: −1.00), for height from −3.64 to 1.18
(mean: −1.04), and for head circumference from
−4.27 to 1.37 (mean: −1.08). z scores less than −2
were found in 16% of the children for height, 20% for
weight, and 17% for head circumference. Growth
measurements varied depending on location of resi-
dence before adoption (Fig 1). Children who resided
in orphanages had significantly lower z scores for all
3 anthropometric measurements than those who re-
sided in foster care before adoption (height, P = .03;
weight, P = .01; head circumference, P = .001). Chil-
dren from mixed care had intermediate measure-
ments. For children who were younger than 2 years
at arrival, regardless of location of residence before
adoption, z scores for growth measurements corre-
lated inversely with age at arrival (height r = 0.30, P
= .004; weight r = 0.37, P = .0004; head circum-
ference r = 0.26, P = .0149; Fig 2).

Infectious Diseases
Intestinal parasites were found in 8% of children
(mostly *Giardia lamblia* or the nonpathogen *Blastocys-
tis hominis*; 1 child had both *Trichuris trichiura* and
*Hymenolepis nana*). No child had hepatitis B surface
antigen, although 2 had hepatitis B core antibody
(probable maternal antibody); 73% had hepatitis B
surface antibody. One child had antibodies to hepa-
titis C; these disappeared consistent with maternal
antibodies. No child had HIV infection or syphilis
(although 1 child had been born to an HIV-infected
mother and another had congenital syphilis that was
treated in Guatemala). Seven percent had positive
tuberculin skin tests and were placed on Isoniazid
prophylaxis after additional clinical assessment. Fifty
seven of 84 had Bacille Camille-Guerin scars. Other
infectious problems identified at arrival included oti-
tis media (10 children), diarrhea (6, including 1 with
rotavirus), caries and/or dental abscesses (4), head
lice (3), scabies (3), conjunctivitis (2), pneumonia or
bronchitis (3), pyelonephritis (2), roseola (1), and
yeast dermatitis (1). No differences were found in the
incidence of clinical or laboratory markers for infec-
tious diseases related to location of residence before
adoption.

Other Medical Conditions
Various other medical conditions were diagnosed
by screening tests and physical examination. Thirty
percent of children had anemia (hematocrit <30%);
4% had mild eosinophilia (absolute eosinophil counts: 720–886); 3% had elevated lead levels (9.9–33 µg/dL); 11% had abnormal urinalyses (indicative of urinary tract infections in all but 1 child, who had isolated hematuria); 6% had minor, transient abnormalities of thyroid function tests; and 23% had mildly abnormal liver function tests (elevated transaminases [less than twofold elevation], which subsequently returned to normal).

No child had information available about prenatal exposure to alcohol. The 4-digit diagnostic code for fetal alcohol spectrum disorders was used to categorize evidence of prenatal alcohol exposure in children who were seen more recently, although this test has not been standardized in Guatemalan children. Of these 67 children, 48 (72%) were categorized as “no sentinel physical findings or central nervous system abnormalities, alcohol exposure unknown”; 14 (21%) as “sentinel physical findings, alcohol exposure unknown”; 4 (6%) as “sentinel physical findings/neurobehavioral disorder, alcohol exposure unknown”; and 1 (1.4%) as “sentinel physical findings/static encephalopathy, alcohol exposure unknown.” In most cases, the sentinel physical findings reflected smoothness of the philtrum and diminished upper lip circularity.

Other medical problems identified at first visit included various minor birth defects and birth marks including 2 or more café-au-lait spots (20 children), preauricular ear pits (7), asymmetric ears (6), unilateral ptosis (4), heart murmurs (5), strabismus (5), hypospadias (2), developmental dysplasia of the hip (1), club feet (1), skull asymmetry (1), small phallus (1), and hemangioma (1). Neurologic diagnoses at arrival included hypotonia (12 children), clonus (6), hypertonia (2), spastic tetraparesis (1), pervasive developmental delay (1), mental retardation (1), and tremors (1). Neuropsychiatric findings on arrival included “self-comfort” or self-stimulatory behaviors such as rocking or head-banging (8 children), depression (1), posttraumatic stress disorder (1), eating disorder (1), and severe sensory integration disorder (1). Other diagnoses included uncertain age (4, all from the mixed-care group) and 1 patient each with preadoptive child abuse, rickets, hemoglobinopathy (hemoglobin AC), hemophilia A, and lactose intolerance.

Adequacy of Vaccinations

Fifty-six (54.3%) children had vaccine records from Guatemala to evaluate. Age-appropriate standards for vaccination were applied to these records. Numbers of vaccinations and appropriate intervals were assessed for each vaccine administered (Table 1). Overall, 29 (28%) children had vaccine records that met American Academy of Pediatrics age standards.

Preadoptive Medical Records

Preadoptive medical records from Guatemala varied in quality and scope. In this group, 39 had preadoptive medical records for review. Twenty eight of these had been reviewed before adoption by the International Adoption Clinic staff. Information on birth measurements was recorded sporadically, with birth weight listed on 39 records (mean: 2814 g; range: 1876–3842), birth heights on 12 records (mean: 48 cm; range: 46–51), and head circumference on 12 records (mean: 33.7 cm; range: 31.4–35). Gestational age, when recorded (18 records), was always stated as “40 weeks” or “full-term.” Although the numbers were small, no differences were found in birth measurements or gestational age and location of residence before adoption. Apgar scores were seldom listed. Little medical information was given besides occasional growth measurements, short descriptions of the child’s development, and lists of administered vaccines. Blood test results for HIV, hepatitis B, and syphilis were provided occasionally; in some cases, the results of testing of the birth mother was given.

Developmental Assessment

All children underwent complete developmental screening at the time of their visit to the International Adoption Clinic. Mean scores (±SE) for gross and fine motor, cognition, social-emotional, receptive language, expressive language, and activities of daily living were, respectively, 85 ± 2.0%, 89 ± 2.0%, 91 ± 2.2%, 92.5 ± 2.6%, 82.2 ± 2.2%, 80.3 ± 2.3%, and 84 ± 2.5%, reflecting that most children were doing well developmentally. Some children scored poorly in all domains; 14% were determined to have global developmental delay. Neither location of residence before adoption nor age at arrival correlated with the presence of global developmental delays. The domain with the broadest range of scores was expressive language (range: 27–136%, likely reflecting the broad variability in time to learn a new language as well as the variation in exposure to spoken language before adoption). Cognition, expressive and receptive language, and activities of daily living skills correlated inversely with age at arrival for children who were younger than 2 years at the time of adoption (respectively, r = 0.34, P = .003; r = 0.32, P = .003; r = 0.45, P = .0001; and r = 0.33, P = .03; Fig 3). Thus, children with higher scores in these areas tended to be younger at arrival.

Evaluation of Pair-Matched Children From Orphanage or Foster Care

For comparing the health and developmental status of children who were cared for in orphanages or foster care before adoption, each of the 25 children who were adopted from orphanages was matched for age at arrival, interval from arrival to clinic visit, and gender with a child who was adopted from

<table>
<thead>
<tr>
<th>Vaccine (N)</th>
<th>Inadequate, %*</th>
<th>Adequate, %*</th>
<th>Excessive, %*</th>
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</thead>
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<tr>
<td>DTP (53)</td>
<td>23</td>
<td>75</td>
<td>1.8</td>
</tr>
<tr>
<td>Polio (56)</td>
<td>18</td>
<td>78</td>
<td>3.6</td>
</tr>
<tr>
<td>HIB (47)</td>
<td>43</td>
<td>57</td>
<td>0</td>
</tr>
<tr>
<td>Hep B (47)</td>
<td>17</td>
<td>83</td>
<td>0</td>
</tr>
<tr>
<td>MMR (14)</td>
<td>14</td>
<td>86</td>
<td>0</td>
</tr>
<tr>
<td>Varicella (11)</td>
<td>0</td>
<td>100</td>
<td>0</td>
</tr>
</tbody>
</table>

DTP indicates diphtheria-tetanus-pertussis; HIB, Haemophilus influenzae type b; Hep B, hepatitis B; MMR, measles-mumps-rubella.

* Of those with a record to review.
foster care. The reasons that individual children were assigned to orphanage or foster care before adoption were unknown. The mean age at arrival was 11.6 ± 2.2 months for both groups. The age at visit to the clinic was 13.8 ± 2.3 months for the orphanage care group and 13.0 ± 2.2 months for the foster care group (nonsignificant). The male/female ratio was 13:12 for the orphanage group and 16:9 for the foster care group.

Among these pair-matched children, z scores for growth correlated with location of residence before adoption (Fig 4). Children who had resided in orphanages before adoption were significantly smaller for height, weight, and head circumference ($P = .03$, .05, and .04, respectively) than those who had received foster care. The prevalence of medical conditions (infectious diseases, anemia, lead poisoning, elevated liver transaminases, elevated thyroid function tests, and abnormal urinalyses) did not differ between the 2 groups, although sample sizes were small. Furthermore, no significant differences were found in the distribution of 4-digit diagnostic codes for prenatal alcohol exposure among the 2 groups.

Developmental achievement for the matched pairs of children did not differ for gross or fine motor skills, expressive or receptive language skills, social-emotional skills, or activities of daily living, although sample sizes were small. However, those who had resided in foster care had significantly higher scores for cognitive achievement at arrival (96 ± 4.6% vs 88 ± 2.8%; $P = .021$) compared with those who had resided in orphanages.

**DISCUSSION**

Guatemala has been increasing in popularity as a source of children for American parents who adopt internationally. More than 2300 Guatemalan children arrived in the United States in 2003. Many international adoptions are arranged by private attorneys, a different system than in most other countries from which American parents adopt. Most Guatemalan
children are referred to their adoptive parents shortly after birth. However, the lengthy time required for all legal requirements to be met postpones the placement of children into their adoptive homes.

Despite these delays, some adoption professionals have supposed that Guatemalan children are “healthier” than children who are adopted from other countries. Reasons suggested include the young age of many children at arrival and, for many, residence in foster care before adoption. Furthermore, there is a perception that there is reduced likelihood of prenatal exposure to drugs or alcohol in Guatemala. No previous analysis of this population of children has specifically addressed these questions.

In this survey of health and developmental status of 103 children who were adopted from Guatemala, we found several notable findings. For children who were adopted before 2 years of age, the age at adoption inversely correlated with developmental scores for cognition, expressive and receptive language, and activities of daily living. Thus, the longer children waited for adoptive placement, the lower their developmental achievements in these important areas. For example, children who were placed with their adoptive families at “older” ages had lower scores in the important areas of cognition and language, even children who had resided in foster care before adoption. Furthermore, age at adoption inversely correlated with growth. The older the children at the time of adoption, the smaller they were compared with nonadopted peers. Again, similar patterns were found for both the orphanage and the foster children. These findings strongly support the need for timely adoptive placement of young infants.21,22

The reasons for these deficits are unknown, although delayed growth and developmental milestones have been reported among children who were adopted from orphanages,23–26 and the adverse effects of orphanage life on child development have been described comprehensively.25–32 Among orphans in Iraqi Kurdistan, behavioral problems increased in children who resided in orphanages compared with those who were placed in foster care.33 In the present study, it was surprising to identify delayed growth and development among children who resided in foster care. For some children in this study, foster care placements may have been suboptimal (inattentive caregivers, minimal stimulation, multiple children) and likely provided less enriched and supportive environments than later adoptive homes. Some children may have been in multiple foster placements without the awareness of their adoptive parents. Few adoptive parents had the opportunity to meet the foster parents who had cared for their children or to assess the quality of care that their children received.

Unfortunately, little could be determined about the details of care that the children in this survey received in any of the settings where they had resided. It is likely that the quality of orphanage care also varied considerably. Orphanages are not homogeneous; some provide attentive, loving, individualized care in a group setting that can be superior to indifferent foster care. Likewise, the quality of care that the children in the group who received mixed care could not be assessed specifically. Nonetheless, we found that there were significant differences in the growth and developmental status of young children who had resided in these 3 disparate settings before adoption. Children who had resided in foster care had better growth and cognitive development than those who resided in orphanages before adoption, whereas children who received mixed care had intermediate results for growth.

The circumstances under which an individual child was placed in an orphanage or in foster care were also unknown. In most cases, poverty was the likely trigger for relinquishment of the child. It would be worthwhile to determine whether the health status of children who were placed in orphanages or foster care differed at entry into those settings. The birth records that were available for review did not highlight any differences in birth measurements or gestational age among the 3 groups of children, although such records were sketchy.

This group of Guatemalan children had a similar pattern of medical and infectious diagnoses to that reported among children who were adopted from other countries. However, compared with children in our previously reported study of 452 Chinese adoptees, the incidence of lead poisoning and hepatitis B were less among the Guatemalan children (14% vs 3% and 6% vs 0%, respectively). The Guatemalan children also had less frequent global developmental delays (14% vs 44%) and overall better growth measurements for height and head circumference (z scores less than −2 in 16% and 17% vs 39% and 24% for the Chinese children). The incidence of other infections and medical problems was comparable in both groups.

No information about prenatal alcohol exposure was available for any children in this review. Alcohol use in Guatemala varies widely; between 20% and 48% of women use alcohol.34 Using the 4-digit diagnostic scale for prenatal alcohol exposure, we found that the majority (72%) of children had no findings suggestive of prenatal alcohol exposure, whereas the remaining 28% had some sentinel physical findings (diminished lip circularity and philtrum development), although sample size was small. Seven percent of these also had neurologic findings that could have reflected prenatal alcohol exposure. Although the applicability of this scale to Guatemalan children has not been validated specifically, it was devised for use with a broad range of ethnic groups.15,16 However, conclusions about the validity of this scale in Guatemalan children or use of this scale to predict long-term behavioral and developmental outcome would be premature without additional detailed investigation. Comparable data on the prevalence of phenotypic facial features suggestive of prenatal alcohol exposure has not yet been reported in children who are adopted from other countries.

In other populations of internationally adopted children, questions have been raised about the adequacy of vaccine records and the immunogenicity of
administered vaccines.\textsuperscript{12,35–38} In this group of children, only 56 (54\%) had records available for review. Approximately half of these children (28\% of the total children) had records that completely met American Academy of Pediatrics standards for age, far better than the 9\% reported in a large survey of internationally adopted children (most from China and Russia).\textsuperscript{39} Our study did not specifically address the immunogenicity of vaccines administered in Guatemala.

Most dramatic, we found that Guatemalan children who were matched for age at adoption, interval from adoption to evaluation, and gender fared markedly better for growth and cognition when they had resided in foster care before adoption rather than in orphanages. Status at the time of adoption does not necessarily predict later outcome, although a growing literature supports a relationship between these conditions.\textsuperscript{6,21–24,39–41} In other populations, growth and cognitive performance in early life are related to later development.\textsuperscript{42–50} Our results suggest that adoption professionals, governments, and other regulatory agencies should coordinate efforts to promote early placement of children who are identified for international adoption.

REFERENCES

1. Immigrant visas issued to orphans coming to the U.S. Available at: http://travel.state.gov. Accessed March 10, 2005
45. Galler JR, Ramsey F, Solimano G. Influence of early malnutrition on...
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