

Environmental health plan for a children's centre in Mongolia

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Abstract

This study aimed to investigate and analyse the current environmental health status of a children's centre in Mongolia, and propose a stepwise series of improvements that are cost-effective, sustainable, and beneficial to the community. The children's centre cares for abandoned children, in the coldest capital in the world. With no basic environmental health infrastructure, this socio-economically disadvantaged child population is at significant risk of poorer health outcomes and chronic diseases in adulthood when exposed to these environmental hazards. Limited resources, overcrowding, unimproved water sources, poor quality pit latrines and a lack of hygiene education have lead to poor environmental health indicators, including respiratory disease, infectious diarrhoea and skin complaints. The yard is dusty, waste disposal is unregulated, and inefficient stoves lead to high fuel costs and indoor air pollution. Solutions in the children's centre must be simple to implement, suitable for the environment of Mongolia and appropriate for a child population, as well as being cost effective and maintainable. Most important is the development of a safe, on-site water source and upgrading of the simple pit latrines. Other suggestions include modification of health-related behaviour, renewable energy sources, improved heating systems and waste disposal.

Keywords: Environmental health, health in Mongolia, children's centre

Introduction

The children's centre investigated for the purpose of developing an environmental health plan was established in 1995 to provide a home for some of the numerous abandoned or abused children in Mongolia, who would otherwise have led a life on the streets. The poor socio-economic status of this remote, developing country means that the street children have to fend for themselves in a harsh climate, with temperatures as low as minus 40°C in winter. Summary health statistics are presented in Table 1.

Table 1: Vital statistics in Mongolia (NSO, 2005)

Statistic	1990	2002
Crude birth rate (per 1,000 population)	35.5	18.81
Total fertility rate	-	2
Infant mortality rate (per 1,000 live births)	97	58
Under - 5 mortality rate (per 1,000 live births)	140	71
Maternal mortality rate (per 100,000 live births)	>176	160
Crude death rate (per 1,000 population)	7.09	6.07



The children's centre is situated in a remote, isolated Ger district (shantytown), which lacks basic environmental health infrastructures, such as piped water supply or sewage systems. The 148 children (aged 4 months to 22 years) live in Mongolian-style straw bale houses or gers (traditional tents) as family groups, with one housemother to every 10 children. The centre has no state funding, depending on irregular donations from local businesses, non-governmental organisation (NGO) support and volunteer staff. The last two years have seen a rapid population increase with resultant insufficient funding and facilities. The children are living in crowded bunkhouses with limited access to water, sanitation and health hardware. There are problems with infectious diarrhoea, respiratory conditions and skin complaints, which have been linked with prevailing environmental health conditions and may predispose children to chronic health problems in later life (Canyon 2005).

Structured environmental health planning is lacking in the Children's centre to date.

As an 'at risk' population (being both children and socio-economically disadvantaged), evidence predicts poorer outcomes such as higher infant mortality rate and higher rates of disease in those exposed to significant environmental hazards (Canyon 2005). The centre therefore has a huge responsibility to provide these children with a safe, healthy, productive and sustainable environment from which they can prosper. Leading causes of morbidity in Mongolia are presented in Table 2.



The aim of this community plan is to provide an overview of the current environmental health status of the centre, and then prioritise the findings into a stepwise series of suggested improvements that are both cost-effective and simple, but which would help improve the overall health and well-being of the community. By structuring the centre's needs, potential financers can be approached for more focused funding.

Table 2: Leading causes of morbidity in Mongolia (UNEP, 2002)

Morbidity	No. Cases	Rate/ 100,000
Respiratory system	201,501	8,293
Digestive system	119,969	4,937
Genitourinary system	113,045	4,652
Cardiovascular system	69,798	2,872
Injuries and external causes	57,784	2,378

Investigation and analysis

Motivation of the centre

The children's centre was established for the many children in Mongolia who have no formal identification papers and exist without state recognition, being unable to attend state orphanages. Many of these disadvantaged children are suffering from pre-existing complaints such as malnourishment, foetal alcohol syndrome, hepatitis and mental trauma. Poverty in Mongolia is escalating and the centre has dramatically increased in size – more than doubling in 3 years. Referrals come from police authorities or families themselves, who cannot support the child.

Resources and planning

Without state support, resources are limited and the centre is unable to fully develop, as it would like. Improvements are irregular and infrequent, relying on fundraising efforts within the community. This has resulted in a disordered yard that, whilst functional, has had no environmental planning or formal review. There has been no external consultative assessment to date and no documented environmental health policy exists. The staff time is understandably taken up with childcare, and there are insufficient resources to contract a specialist. Good health and hygiene policies have been introduced, such as hand washing before meals, but staff are aware that there is room for improvement with time, money and particularly a lack of environmental health knowledge being the limiting resources.

Social policies

Despite the hardships, there is a positive ambiance in the centre. The staff are compassionate and dedicated, the children are happy, and there is no question that the centre provides a valuable service. Unlike the state orphanages, the children very rarely abscond. The overwhelming aim is to avoid institutionalisation by caring for the children in an environment similar to home (i.e. traditional homes, unsealed yard, dogs, daily chores). Whilst this may help with re-introduction to society, this presents obvious environmental health risk challenges as a yard caring for 80 children is significantly harder to supervise than a family yard, particularly with respect to hygiene.

Environmental health indicators

The children's centre has a local nurse and visiting Mongolian doctor, who are not proactive in health promotion. With no child registration papers there are difficulties accessing the state health system with fatal consequences reported in one case. No health monitoring programmes or summary morbidity data exist, therefore incidence/prevalence figures cannot be determined. Reported illnesses include diarrhoea, chest infections, skin infections/boils, and hepatitis A, which could result from poor sanitation, hygiene and overcrowding. This disease pattern is similar to that of the general population where infectious diseases account for a significant morbidity rate (Table 3). More investigation is required to document if the children's centre falls within the population norms. Mongolia has one of the highest tuberculosis burdens in the Western Pacific region. The incidence is reported as 155/100,000 population, though the WHO estimates this figure may be closer to 250/100,000 population. No TB screening programme is currently in place for the centre, although a number of children and staff have previously been diagnosed.

Summary findings and analysis

In order to investigate the current status of the children's centre, I undertook a simplified rapid appraisal analysis, which involved site visits and discussions with the staff, local NGOs and mining/exploration consultants. This gave an insight into the perceived problems and helped provide Mongolia-specific solutions. A brief review (Table 3) highlights some of the environmental health issues that need to be prioritised and addressed in the children's centre.

Table 3: Investigation and analysis of environmental health status in the Children's centre

Environmental Health Concern	Current Status	Concerns	Potential Health Risks
Housing	3 straw bale or wood/plaster bunkhouses 2 canvas gers Thick walled or felt insulated for winter Electric ceiling fans for summer	Overcrowding – 3 to a bed Staphylococcal skin infections, boils and head lice evident Straw bales rotting due to poor foundations / lack of roof overhang protection Lack of health hardware – laundry, water supply, showers, waste bins. Poor insulation – doors, windows, roofs	Person-person spread of all infectious diseases, including diarrhoea, respiratory, skin Increased risk TB Cold exposure in winter Poor hygiene
Water	Community deep bore 400m away reported clear and cold supply hand fetched in barrel from kiosk irregular kiosk opening times relatively expensive Boil before drinking policy Stored in kitchen	Classified as unimproved (UNDP 2004) Pipe from source left on ground between filling Poor accessibility, insufficient supply Unknown quality - pit latrines within 10m Trip difficult in cold winter Not always boiled Containers not sterilised or covered	Water-borne pathogens Poor hygiene due to limited accessibility Trauma / cold exposure during winter trips
Sanitation/ Hygiene	4 simple pit latrines in yard wooden seat and surround relocation when full unlit Soak pit in yard Hand filled sinks in bunkhouses Showers in tub, twice a week, or in Tuul river (500m away) Laundry on another site	Unimproved sanitation status (UNDP 2004) Pits nearly full Latrine and soak pit in centre of play yard Potential groundwater pollution if future on-site water source Relocation frequently needed - limited space Soak pit uncovered and full Wastewater poured into pit latrines Tuul river - documented pollution (UNEP 2002)	Intestinal worms, infectious diarrhoea and hepatitis Trauma – no lighting Environmental (groundwater) Pollution Vector borne diseases
Nutrition/ Food	Vegetarian diet Refrigeration available only on other site Vegetables stored in buckets	No food handling / preparation policies Unsealed storage facilities Irregular fresh veg/fruit supply Locally made protein supplements	Failure to thrive Inability to correct pre-existing malnourishment Infectious diarrhoea / hepatitis
Waste/ vectors	Refuse uncovered in yard Irregular waste collection Screens on windows No recycling	Flies/mosquitoes a problem in summer Previous refuse fire, with loss of building Latrines and soak pit inadequately protected from vectors	Vector borne diseases (infectious diarrhoea, intestinal worms) Fire hazard
Power source/ heating	Electricity from mains supply Ger stoves (solid fuel) used to heat up buildings with direct heat Gas stoves in kitchen	No electricity back-up Unprotected hot stoves Poorly ventilated rooms with burning low-grade fossil fuels – indoor air pollution Inefficient, poor quality ger stoves. Large cost from coal in winter (up to 15 tons coal per stove)	Trauma (burns) Respiratory illness Higher infant mortality rate - high levels atmospheric particulate matter (GEO-2000 2000)

Environmental Health Concern	Current Status	Concerns	Potential Health Risks
Yard/ play area	Unsealed, dirt yard Dogs in play area No vegetation (harsh climate) Surrounding high fence – roads unsealed	Dust storms in Spring Difficult to keep clean – litter/glass present Dog faeces evident	Trauma (glass) Respiratory illness, eye, ear and skin infections (dust). Dust borne pathogens Bowel parasites and helminths (dog faeces)
Health Conditions (Determine response to environmental health concerns)	Permanent nurse and visiting doctor Vaccination schedule in place Growth charts available Own medications – donated Small clinic room	No regular monitoring or audits in place Morbidity/mortality rates unknown - reported high levels of infectious diarrhoea, respiratory illness and skin disease Expired or inappropriate drugs found in supply Limited access to state hospitals and unable to manage in-patients on site High tuberculosis rates in community, 2 recent known cases in centre. No screening. No isolation beds for infectious diseases	Inadequate treatment of illness (insufficient medications) Infectious disease spread (no isolation) Increased mortality (no hospital access) Tuberculosis status unknown

Solutions

There is international evidence that poor childhood environments are a significant determinant of chronic diseases in adulthood (Canyon 2005). The children's centre already provides an improved, caring environment compared with the home or street. It is, however, vital that this upgrade is continued so the centre provides the best possible environment health that resources allow. This plan will propose a number of environmental health improvements. Resources are limited and it must be determined which of the solutions could be internally funded and which would need external fundraising. Many of the foreign mining or exploration companies in town have access to drilling, engineering and environmental planning resources. It may be that if provided with a structured plan for the children's centre, they would find one aspect that they could facilitate, and in doing so support the local community.

Maintenance and hardware are difficult to upkeep in the centre, with just one Mongolian caretaker who has limited knowledge of environmental solutions. It is vital that all solutions should be simple to implement, suitable for the environment of Mongolia, and appropriate for a child population, as well as being cost effective, simple to maintain and providing significant improvements in the environmental health indicators.

Education with community empowerment is vital to the success of the project. Improving hardware facilities without a change in health related behaviour and hygiene practices is futile. Community participation is essential as many of the stakeholders have suggestions and an intimate knowledge of previous failures, as well sensitivity toward local cultures. Once the solutions have been discussed, it would be vital to prioritise the solutions according to a number of pre-determined criteria, such as those suggested by Hawe (1996):

- Resources available
- Burden or size of each issue
- How amenable to intervention the problem is
- How much distress each problem causes
- The level of concern for each issue

Coordination of investors and fund management would then dictate how the projects were to proceed.

Advance planning to allow for population growth should be included into the implementation of the plan, so that a lack of facilities does not cause problems in the future. A disaster management plan, focusing on disasters such as earthquakes, fire, infectious disease epidemics and extreme cold weather

is required. Simple things such as first aid training and fire extinguishers could be used to supplement this.

A vital aspect of environmental planning is the development of monitoring and health indicators. Inclusion of health professionals into the planning with guidance on how to monitor morbidity/mortality rates and child health (by an NGO such as UNICEF) would demonstrate the impact of the improvements. This in turn could be used to show investors the effects of their funding, and may encourage more.

Specific recommendations

“Without sustained healthy eating, clean water and adequate sanitation, all other health prevention and clinical interventions will be seriously undermined” (Canyon 2005). Vision-21 (WHO, 2003) promotes access to water supply, sanitation and hygiene for all by the year 2025. These are fundamental human needs that should be the highest priorities to achieve a minimum basic level of environmental health infrastructure in the children’s centre. Heating is another issue, specific to Mongolia, which is essential for survival.

In order to maximise the benefits from this environmental health plan, it would be necessary to nominate somebody at the centre to supervise, implement and monitor the solutions. This could be managed by one of the expatriate NGOs who already have a presence in the centre, such as VSO, along with a Mongolian assistant.

Water

According to the UN “4-A’s Principle”, water should be accessible, available, adequate and affordable (UNDP 2004). No matter the quality of water, if there are insufficient supplies, then health suffers as a result of inadequate hygiene.

- Quality control checks of current supplies – if evidence of contamination then need for immediate treatment (boiling and chlorination), and report finding to district authorities (supplier)
- Improve storage containers – sterilised and covered
- Development of improved source - currently no plans to connect the Children’s centre district to a piped central source.
- Recommend on-site solution - reduces the need for hand-carrying, increases accessibility and allows internal quality control and community responsibility.
- Previous boreholes have proved the existence of a ground water supply. Consultation with drilling companies in Mongolia suggest that a borehole could be drilled and connected to a electric pressure pump (available in Ulaanbaatar), which would then feed a water chamber with a pressurised water source. Heated pump house and well-insulated storage necessary for winter temperatures.
- Expert consultation to confirm that an on-site borehole suitable. Is yield adequate for expected population? Maintenance must be available locally at reasonable cost.
- Siting of the borehole - sanitation facilities should be situated downhill and at least 30m away.
- External funding required, although a foreign drilling company may be able to bore the hole as a community project. Cost of running the pump would need to be further assessed.
- Water quality should be tested for coliforms before use, and regularly thereafter.
- Eventual aim to have piped supply to bunkhouses, for hygiene improvement.

Photos: Children collecting water at the local kiosk



Sanitation

The current simple pit latrines are unimproved and need urgent review. Hygienic disposal of children's stools can lead to a 30-40% reduced risk of serious diarrhoeal illness (Canyon 2005). Incremental sanitation provides cost-effective initial solutions, which can be upgraded over time, have efficient use of resources and are simple to maintain. Previous attempts at improvement (with flush toilets and septic tanks) have failed due to lack of maintenance and limited space.

Toilet facilities

- Improve current hygiene practices – hand washing facilities and enforcement, toilet paper, hygienic disposal of children's stools from potties.
- Lighting of toilet area
- Screened protection from flies and vermin
- Development of local improved solution, as centralised option not available.
- On-site sanitation is the preference in Mongolia, due to cold winters. Although this raises some concerns in an overcrowded, restricted space, research states that a well-constructed and well-maintained on-site latrine is a viable solution (DFID 1998).
- Potential for groundwater contamination should be anticipated with situation of the latrines more than 30m from the water-point.
- Initially, start with lined twin-pit system - removes the need for relocation and requires minimal technical assistance or cost. The filling/emptying cycle is likely to be three to six years and options for emptying must also be investigated. Manual methods are commonplace although contractors may be available, at a cost. (DFID 1998).
- Consultation with experts – siting and sizing the pits for the number of children.
- Aim to upgrade to VIP latrines with improved socio-economic status

Wastewater

- Education and enforcement to prevent disposal in pit latrines
- Screened protection of current pit – to limit vectors and prevent rubbish disposal
- No centralised option. Vacuum trucks too expensive and unreliable.
- Improved on-site solution necessary. Due to the harsh winters, reed beds are not viable options and space is limited.
- Soakaway pit provides the simplest, most cost-effective solution. Should be large enough to cope with daily volumes, and filled with rocks to fix particles and for bacterial detoxification of the water.
- Pit position crucial - 30m from groundwater sources and 1m above the water table (Greenwood-Smith, B 1997). Expert consultation required.

Photo: The play yard, with toilets in background and soak pit in foreground.



Power

- Education on energy efficiency and power saving practices – gas kitchen stoves have reduced costs somewhat.
- Back-up source required especially if water pump electrically operated– batteries charged from mains supply developed by the WHO.
- Renewable energy source – high capital outlays, but cost-effective in long-term. Solar power with battery bank ideal as abundant sunshine (more than 3000 hours per year) and relatively small electricity demand in centre (few appliances). Use for lighting, refrigeration, fans and a solar hot water system – bathing and laundry.
- Requires local access to technical assistance and maintenance.

Heating

Required for nine months of the year due to extreme cold. Solid fuel costs are largest outlay of the centre.

- Fencing / protection required around hot stoves.
- Improved insulation of buildings – roofing, windows, doors.
- Use of high quality fuel, such as charcoal briquettes rather than raw low-grade coal – increased efficiency, reduced indoor air pollution.
- Traditional ger stove improvement kit (US\$15 - World Bank 2003) - increases fuel burning efficiency thereby reducing costs and indoor air pollution. Can reduce coal consumption by 35%.
- New, improved stoves (US\$60 - World Bank 2003) - further reduces fuel requirements (so decreasing costs) and the levels of air pollution.
- Eventual aim for solar powered hot water piping system - ger stoves could then be used as a heat back-up system only.

Photo: Ger Stove providing direct heat in the bunkhouse.



Yard and refuse

- Extension of existing cement paths to all buildings
- Increased regularity of yard cleaning – litter.
- Hygienic disposal of dog faeces
- Dust Reduction - planting of vegetation not viable due to the harsh climate. Planking and cement are harsh surfaces for children to play on and can be lethal in the frozen winter. Spray-on dust sealants not available in country. Suggest a covering of smooth pebbles/gravel - helps with dust suppression, and is easier to keep clean.
- Sealed off, covered area for refuse, with ventilation and screens (to protect from flies and vermin). Positioned more than 10m from potential water source, and away from play area.
- Enforcement of correct waste disposal methods (e.g. separate hot ash from flammables – a recent fire was caused by this)
- Encourage more regular waste truck pick-ups, despite extra cost.
- Waste recycling (paper, cans and plastic) – increasingly popular with Mongolian contractors. Source of potential revenue.

Housing

- Mongolian culture of bed-sharing cannot be changed.
- Improve health fittings as environmental plan progresses – sinks, heating pipes.
- Review by construction experts/NGO - able to renovate current buildings (straw bales rotting due to poor construction), or should be aiming to re-build? External funding required for this
- Future buildings need to consider site position, correct construction techniques, insulation, ventilation and allow for population growth.

Diet/food handling

- Regular monitoring of child growth markers – Height, weight, head circumference.
- Review of current diet by nutritionist (NGO) to assess impact of vegetarian status, and provide recommendations.
- Food handling policies and food hygiene education for housemothers and kitchen staff – hand washing, clean kitchen utensils, correct food preparation and cooking.
- Improve food storage facilities – covered containers.
- External funding to provide on-site refrigeration.
- Hepatitis A vaccinations kept up-to-date.

Hygiene

- Enforce twice weekly showers – to increase if on-site water availability.
- Health education and promotion for all staff and children to improve health-related behaviour and support the environmental health hardware solutions.
- Laundry should also become more convenient with an on-site water source – washing machine when funding available.
- Discourage access to nearby Tuul River – documented contamination (UNEP 2002)

Health

- Environmental health education of nurse / doctor – current projects in Mongolia include PHAST (Participating Hygiene and Sanitation Transformation), developed by the WHO, UNDP and World Bank to promote community ownership and encourage success and sustainability (UNDP 2004). Local facilitators of PHAST should be approached to help with developments in the Children's centre.
- Regular auditing of health determinants amongst the children – classifying diseases and recording morbidity/mortality figures. These provide indicators, which can be used to monitor the success of the program.
- Early detection and isolation of infectious disease cases.
- Implementation of a TB screening programme.
- Approach in-country NGOs, such as UNICEF or WHO, who have global experience in child health care and environmental child health determinants and may offer valuable advice.

Summary

Environmental Health Justice is the right to a safe, healthy, productive and sustainable environment this plan will help the children's centre work towards achieving this goal. Current indicators of poor health and site survey results demonstrated a need for improved environmental health planning. Solutions must be cost-effective, sustainable, and adapted to the harsh Mongolian environment and the child population. With education and hygiene promotion we can modify health-related behaviour and, with a structured environmental health plan, resources can be constructively allocated to gain some focused external support.



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