



# Cranial Loading: The Plight of the Rural South African Female

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## Commentary

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## Abstract

The domestic responsibilities of rural female South Africans are to clean, cook, do laundry, collect food, water and firewood and chaperone children and elderly. Most rural families live in abject poverty, rendering them unable to purchase motorized vehicles to assist with transportation. The most popular method of transport is cranial loading portage. This short commentary highlights the reasons why rural South African females still persist with this method of transportation. Further the innovative halo-head loading cervical support brace designed to assist cranial loading portage will be discussed.

**Keywords:** Cranial Loading; Females; Halo Head Loading Brace

## Commentary

Transport is a key factor for the progress of a community's economic and social development [1]. Well maintained transport infrastructure (such as roads, bridges, staircases, footpaths and footbridges) and type of transportation assist commuters to travel more efficiently and safely. South Africa is a country that possesses both first world architectural buildings and bucolic informal settlements. The South African National Roads Agency Limited (SANRAL) is aware of the transport constraints affecting South African citizens, especially in the rural areas and is making a concerted effort to address these challenges [2].

Rural South African men and women have uniquely differentiated roles in the family and their community. In rural areas, women are accountable for domestic activities such as cooking, cleaning and chaperoning children and the elderly [1]. Females are responsible for the transportation of food, water and firewood within and between neighbouring communities [3]. The most common mode of transport in rural South Africa is walking with only a few families within a bucolic community possessing invaluable transport technologies such as bicycles, wheelbarrows, animals and animal drawn carts [4]. As such the transportation of food,

water and firewood is predominantly completed through cranial loading portage also known as head loading [5]. Due to the various responsibilities that rural females account for, it is a popular sight to see women multi-tasking [6]. Rural female multi-tasking involves collecting food, water and firewood while chaperoning children simultaneously [6]. Therefore, it is common picture to see women and adolescent girls carry food, water and/or firewood on their heads while simultaneously carrying babies on their backs, walking from one point to another [1]. From an early age young girls are taught the responsibility of cranial loading of firewood and water to ensure they can assist their mothers, as well as serve as preparation for their role later in their adult life [7]. Rama reported that the collecting and subsequent cranial loading portage of water and firewood constitutes 48-62% of adolescent and adult females' daily activities [2]. The cranial loading and portage does adversely influence the incumbent's life who incurs neuro-musculoskeletal pain as well as premature termination of scholastic activities and limit time to care for themselves [1]. Conversely cranial loading portage increases the value of the female in the family and community [7].

There are many factors that impact the selection of the mode of transporting food, water and firewood that a rural female can employ. These factors include finances, cultural beliefs, quality of the roads and/or footpaths and weather [2,5]. Many South African rural households experience abject poverty, thereby do not have the money available to purchase animals, carts, wheelbarrows and bicycles. Another escalating financial factor is the cost of maintaining and/or repairing damage wheelbarrows, carts and bicycles. Footpaths and footbridges are the main transport infrastructure used by the rural South Africans. The footpaths (or dirt trails) traversed on by rural citizens, have their own unique challenges, which include being too narrow, steep, slippery and inaccessible when it rains, as the ground become damp and sink under foot pressure. The narrow footpaths exclude the use of animal drawn carts, thereby encouraging the use of cranial loading. The footbridges are general constructed of timber which degenerates over time and cannot with standing heavy masses, which then escalates the severity of task of cranial loading portering forcing the porter to use alternate longer routes [1].

Fernando and Porter described that cultural beliefs is a strong factor that influences the rural woman's ability to use transport technologies, which vary in different communities [5]. Potgieter, et al. [1] reported that in some rural communities, cultural beliefs are relaxed, thereby allowing females to ride bicycles making transportation of essential materials, less energy and time consuming [1]. While other communities enforce strong cultural beliefs, which dictate that the use of bicycles to falls within the ambit of males only (men and boys) [1]. Some communities further extend these cultural beliefs to the riding of donkeys and horses, because community leaders fear that by riding a bicycle, donkey and/or horse will incur the danger of female pubescent and adolescent of losing their virginity [5]. Potgieter, et al. [1] reported that rural families may possess a horse, cow, bull, donkey, animal drawn cart and/or wheelbarrow but females are not allowed to use them because they belong to the men [1]. The animals (horse, cattle and donkey) are used for ploughing the land by males, which are considered invaluable for the use of trivial domestic female transportation responsibilities [1].

Echarri and Forriol has confirmed that habitually cranially loading produces spondylolisthesis and intervertebral disc prolapse, which adversely impacts the person's health and well-being [8,9]. Ellapen, et al. [10] reported that cranial loading produces a kypholordotic posture. Further there has being anecdotal reports that cranial loading produces cervical postural syndrome (cervical flexion), which increases anterior intervertebral disc compression. Cervical postural syndrome is associated with anterior intervertebral disc compression, which predominates impinges the anterior

half the intervertebral disc causing severe neuro-muscular pain [11,12].

In an attempt to design an ergonomically efficient cervical support for rural females who habitually carried cranial loads Richard Benc (an engineer) designed a halo head loading brace [13]. The biomechanical rationale behind the innovative ergonomic invention was to enable the weight of the cranial load to be positioned centrally over the vertebral column. It was postulated that central positioning of the cranial load over the vertebral column, will ensure whole surface area disc compression. This will entail that the entire the surface area of the superior vertebral disc centrum will rest over the entire inferior vertebral disc centrum. By increasing surface area contact between the subsequent vertebrae, the downward gravitational pull of the weight (force) of the cranial load will become evenly distributed over the intervertebral disc, thereby reducing pressure, because pressure is inversely proportional to area (Pressure = Force/Area) [14]. However the ergonomic validity of the halo head loading brace needs to be empirical confirmed. Innovative ideas such as this is much needed to assist rural South African females better manage their domestic responsibilities, alleviating neuro-musculoskeletal pain and thereby improving their quality of life.

## Conclusion

Cranial loading in rural communities in South Africa is strongly engrained in the cultural beliefs that many communities refuse to negate. As such the plight of the rural female South African to carry loads on their heads persist producing numerous negative impacts on their health and wellbeing. Innovative engineering advance adapted cranial loading may a solution to diminish neuromuscular pain and discomfort. Further education of community leaders to allow females to use alternate mode of transport is greatly needed.

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