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Nomads, Refugees and Repatriates: Histories of Mobility and Health Outcomes in Northern Mali

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Abstract

This paper reviews the different pathways through which mobility can influence health, positively or negatively depending on context, by changing susceptibility, exposure or quality of care. The impact of different forms of mobility on health outcomes is considered empirically through a case study of Kel Tamasheq, a Malian pastoralist population who have experienced diverse forms of mobility and immobility in recent decades. As nomadic pastoralists they were highly mobile before being forced, by conflict, into sedentary refugee camps in the 1990s. After repatriation some Tamasheq remain nomadic, some have sedentarised and some are semi-sedentary. Over the same period many Tamasheq women have transformed from being obese and highly immobile to much greater individual mobility. We reflect on the implications of different mobilities for child mortality (as an indicator of health). Survival analysis of birth histories demonstrates that in any single time period the most mobile groups had lowest child mortality, and that substantial within-population mortality differentials exist, unrelated to population mobility. Over two decades child mortality declined considerably and more quickly than amongst sedentary Malian populations probably as a consequence of improved access to immunization and health care in the refugee camps and decreased obesity and increased individual level mobility of young women. Understanding mobility and its diverse impacts and influences on a population may contribute to general understanding of factors contributing to health and welfare of children, but this research provides no evidence that spatial mobility per se can be considered a determinant of health or ill health.

Key words: pastoralist; mortality; mobility; health; Mali

Introduction

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Mobile people are often thought to be disadvantaged in terms of health whether in developed countries (immigrants, asylum seekers, travellers) or less developed contexts (rural-urban migrants, nomadic pastoralists, hunter gatherers).

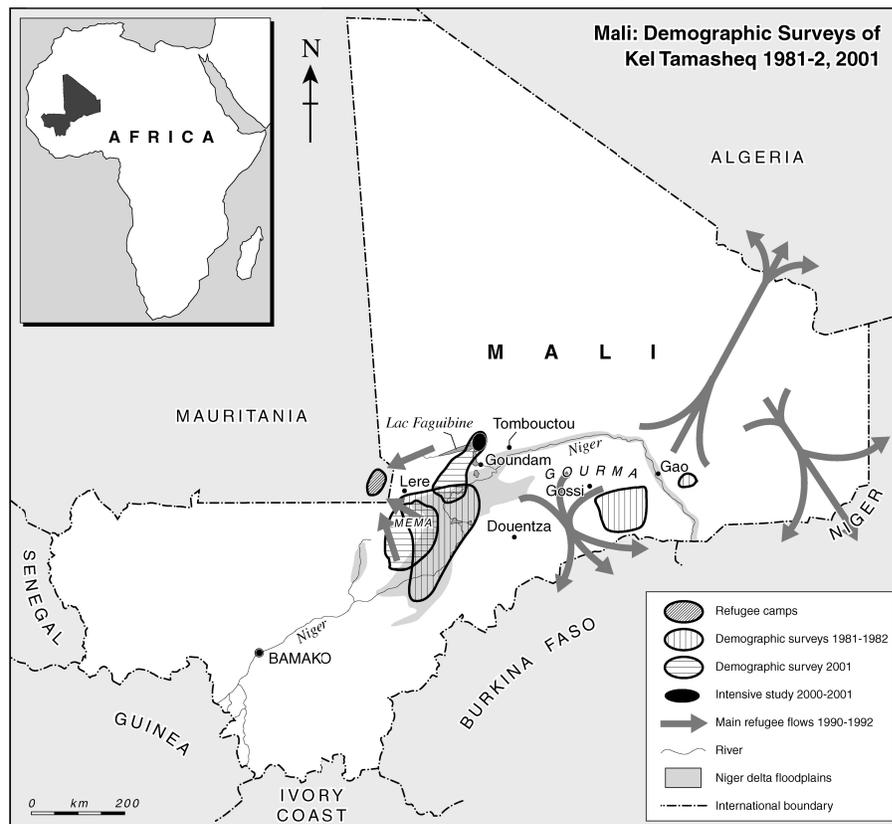
Although mobile occupational groups, including migrants, long distance truck drivers, fisherfolk and the armed forces (Kissling et al. 2005), are identified as being at increased risk of sexually transmitted diseases and HIV/AIDS, with poverty a contributing factor, mobility might equally be associated with socio-economically privileged groups such as students or international business executives and thus with better than average health outcomes, suggesting a need to consider how mobility might influence health.. If mobility as a process modifies health, to what extent is this a direct impact of movement or a consequence of the underlying conditions or situations that generated mobility in the first place, or of the social or psychological contexts in which people find themselves whilst or after moving? Ideally, to establish the impacts of mobility on health, one should compare the mobile with the immobile – but it is rare to find comparable groups of people for whom mobility is the only difference.

Mobility could influence health through three principal pathways: changing susceptibility, exposure or quality of care. I consider each of these and the degree to which one could expect them to interact with mobility in African Sahelian contexts. Figure 1 outlines the major causes of mobility -- all of which can take different forms, intensities and meanings for different populations and sub-groups. In order to conceptualise and understand the potential impact of mobility on health it is necessary to think through each of these pathways for the population under question. There is a whole spectrum of determinants of mobility, some of which may be highly stressful and risky, whereas others may be routine and largely risk-free.

Susceptibility

There are several different scenarios where mobility might influence susceptibility. Migration is often associated with stress and increased stress levels can decrease the effectiveness of the immune system. This has been suggested as one of the causes of high rates of reactivated TB in migrant populations in both developed and less developed contexts. However, where mobility is the accepted or preferred life-style, as for pastoral nomads, hunter gatherers or travellers, lack of mobility may be more stress-inducing. If mobility impacts on nutritional status (likely for migrants, especially in crisis-induced forced migration) then this could increase susceptibility to disease via an impaired immune system (Ulijaszek 1990). In contrast, for populations for whom mobility

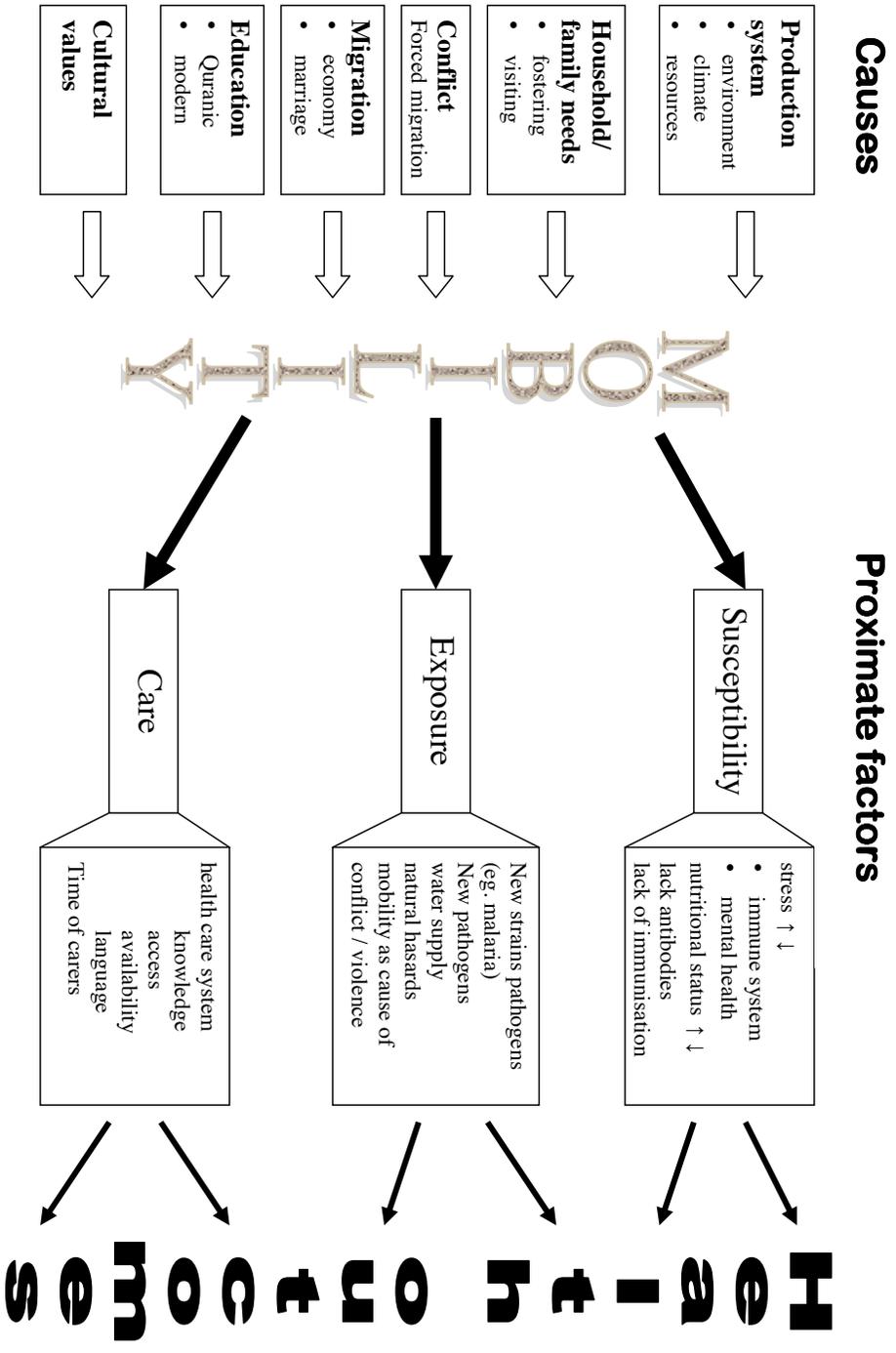
Map 1



is an integral part of the production system, and therefore the means through which food is obtained, immobility has been associated with poorer nutritional status (Fratkin and Roth 2005).

In arid and semi-arid environments mobility is the principal means of exploiting patchy resources (Homewood 2008), population density is low, many infectious diseases cannot be sustained and people are often not exposed to pathogens in childhood and do not develop antibodies (Loutan and Paillard 1992). Such mobile groups may be more susceptible to infectious disease should conditions change. Additionally nomadic individuals generally have low immunisation rates because their mobility renders immunisation programmes costly and logistically difficult, and health service provision is poor in remote areas (Münch 2007). Thus mobility has the potential to influence susceptibility but such influence could operate in different directions depending on the context, the reasons for mobility, the environment within which people are mobile and whether the mobility is part of the 'normal' lifestyle'.

Figure 1: Hypothesised pathways between mobility and health



Exposure

There are many biological reasons why people who are more mobile might have greater exposure to pathogens. Different pathogens, and different strains of the same pathogen tend to be found in different environments, and thus the more environments an individual encounters, the greater the risk of encountering a 'new' pathogen to which s/he has no or little immunity (Dyson 1991a & b). Where water supply is limited and of variable quality the more mobile are frequently forced to use poorer quality water, both for reasons of access (permanent residents control the best water supply) and availability (De Waal 1989). Mobility may also increase individual exposure to environmental hazards either because both the environment and risks are unfamiliar or through the act of movement itself. In contrast, populations for whom mobility is the normal way of life can use mobility and their adaptations to avoid particular hazards. Malian Tuareg avoided going near camps where children were known to have measles (Münch 2007).

Both failure to encounter pathogens whilst children and the ability to exploit mobility to avoid infectious disease occur where mobility occurs in sparsely populated environments. The mobility itself is not really the determinant of low exposure, but rather the package of responses to and adaptations to arid environments include both mobility and low population density.

Access to Care

In the contemporary world mobile groups are most likely to be disadvantaged in terms of access to care, although it is possible to envisage situations where mobility might be beneficial. Mobility in order to exploit patchy resources, where population density is low, is almost invariably associated with poor provision of health care services in terms of distribution, distance, quality of staff and service (an exception being Mongolia in the 1970s and 1980s, Swift et al.1990). Furthermore mobile pastoralist and hunter-gatherer populations are often ethnic minorities who are both spatially and politically marginalised, thus generating additional barriers to accessing health care (Randall 2008). Mobility means that individuals are less likely to speak the same language as health care providers and many migrants have difficulties accessing health facilities because of both language barriers and ignorance of the system (this is equally true in developed countries; Bollini et al. 2007; Davies and Bath 2001; Hoang et al. 2009; Jayaweera et al. 2005). In production systems dependent on mobility, pitching and striking camp and transhuming are additional to other domestic and productive tasks and may impinge on both time and energy available for child care.

Mobility can be highly advantageous in allowing access to care. Provided there are no other major problems such as linguistic or cost barriers, individuals who move can exploit diverse health services with different systems, different subsidies, different specialisations. Hence the relationship between mobility and access to care depends on social context, history, knowledge and resources.

In terms of proximate determinants of health, mobility has the potential to influence health outcomes in both beneficial and adverse ways. This brief overview demonstrates the vast heterogeneity in types of mobility and diversity of the potential impacts on health. It is essential to understand the causes of mobility alongside the degree to which mobility is an entrenched aspect of people's lives to which they are adapted and through which they exploit their environment. Where mobility is imposed by external conditions and undertaken reluctantly or involuntarily, the implications for exposure, susceptibility and care may be very different.

Materials and Methods

Over recent decades the Kel Tamasheq in North West Mali have experienced a range of different types of mobility and immobility, both voluntary and forced. Their example allows us to consider diverse mobility-health interactions.

Kel Tamasheq live across the northern Sahel and most used to be mobile pastoralists, herding goats, sheep, cattle and camels according to the local environment. Two single round demographic surveys of Malian Kel Tamasheq were undertaken in 1981 and 1982 (Randall 1984, 1996, see map 1): both populations were nomadic pastoralists practicing no agriculture and were socially heterogeneous with representatives of all the different Tamasheq social classes; warriors, religious maraboutic groups, vassals, blacksmiths, and Bella slaves and ex-slaves¹. A further single round demographic survey was undertaken in 2001 covering largely the same population studied in 1981. Qualitative anthropological fieldwork accompanied the surveys in both periods. In 1989 a health behaviour study was undertaken in the Gourma using illness episode biographies (Randall et al. 1989).

¹ The Tamasheq term for the ex-slave class is *iklan* but this has pejorative overtones. The Songhay term Bella is frequently used.

The three higher status Tamasheq social classes are mainly of Berber origin and are often referred to both by themselves and other Malians as ‘red’.² Slavery was widespread in pre-colonial times and most Tamasheq slaves (Bella) were originally captured in raids on villages in the area and further south. Tamasheq-speaking Bella are black African and clearly have different genetic origins to the Berber Tuareg. Many Bella were liberated in the colonial period and after independence, although de facto ownership of slaves continued at the time of the 1981-2 surveys with resident Bella undertaking much domestic and herding work. The 1981-2 surveys included both domestic dependent Bella and independent pastoralist Bella who had been freed for one or more generations.

For both populations the 1984-5 drought led to substantial herd losses, population movements, food aid and a mushrooming of international and local NGOs. Dependent Bella left their owners, people moved temporarily to towns and some Tuareg groups started to sedentarise (Randall and Giuffrida 2006). Those who remained nomadic became less isolated, with increased knowledge about the outside world and contact with development projects.

Conflict and Forced Migration

In 1990 Tuareg rebellion broke out first in Niger, then Mali. Thereafter small bands of armed Tuareg attacked military and administrative posts, sometimes killing the incumbents, usually stealing vehicles. The MPLA (*Mouvement Populaire pour la Libération de l’Azawad*) was created with the aim of liberating Tuareg territories in the north. The Malian Army responded by patrolling the areas and soon clashed with the rebels. Rebel attacks increased in intensity throughout early 1991 and gradually expanded westwards towards Tombouctou and the Mema (see map), with escalating retaliations by the Malian army on Tuareg and Maures with men, women and children being killed in camps, villages and towns. The Malian population became incited against the ‘reds’ and there were attacks on shops owned by Tuareg and Maures. Physical appearance was a major factor identifying those who were attacked and after the ‘*massacre de Léré*’ in May 1991, Tuareg in the Delta and Mema areas fled en masse to Mauritania just across the border. Some took their herds and tried to continue pastoral production in Mauritania, facing major problems with access to wells. Others left everything behind or consumed their animals during the flight.

² The terminology of Bella (black) and Tuareg (red) is used here because physical characteristics largely determined fates during the conflict. For simplicity and because of small numbers, blacksmiths are combined with the Bella although in terms of the traditional Tamasheq class groups they are not captive. Most blacksmiths are black African; they were not persecuted during the rebellion and blacksmith women have always been economically active.

UNHCR, WFP and NGOs responded rapidly to the huge influx of people and three refugee camps were set up. Conditions were poor at first because of the scale of the crisis and the isolation of the area. People continued to arrive in the refugee camps from 1991 until 1994. The main waves into the Mauritanian refugee camps were in 1991-2 and the main exodus was in 1996 under a repatriation programme with spontaneous repatriations occurring throughout the period. Although most camp residents had previously been nomadic pastoralists, there were also refugees who had sedentarized after the 1985 drought, along with civil servants, teachers, traders, craftsmen and students. A few domestic Bella fled with their masters but black Tamasheq were not persecuted and most stayed behind in Mali, some with the animals, some leaving the pastoral sector altogether. The nomadic pastoralist Tuareg majority experienced substantial social change in the refugee camps; they were immobilised in one place in a densely populated environment with large numbers of people from different social groups alongside the educated and people who had earlier abandoned mobile pastoralism and pastoralist areas.

Young people enjoyed the novelty of a varied and active social life. Schools were set up alongside adult training programmes to facilitate economic independence after repatriation. Eventually, health care provision included immunisation programmes, free health and maternity care. Whereas the previously nomadic population studied in 1981 had drunk marsh and river water, boreholes now provided clean water.

Repatriation and Transformations

Repatriation made further changes to life-style. Part of the reconciliation and repatriation package developed by the Malian government with UNHCR and other international organizations included promises to build schools, drill boreholes and develop infrastructure in the specific destinations refugees were obliged to name and return to, as well as in other northern communities. For repatriated refugees infrastructure was supposed to be proportional to the population registered. This encouraged sedentarisation and led to a proliferation of wells surrounded by small settlements. People with few or no animals no longer needed to be mobile and many of those who retained animals claimed to have understood the benefits of a sedentary lifestyle, although this transformation included political dimensions (Randall and Giuffrida 2006).

By 2001, four years after repatriation, much of the population was relatively sedentary, few were totally dependent on a pastoral economy and unpaid domestic labour was rare. Participation in formal education was increasing, there

was more knowledge about and demand for modern health services and good quality water was usually close by. All these changes had substantial ramifications for the daily lives of Tuareg women and children.

Tamasheq Demography

The 1980s surveys showed Kel Tamasheq to be demographically unusual for sub-Saharan African populations. Heterogeneity in terms of production, environment and social organization within the Malian Kel Tamasheq population means that we cannot generalise about their demography throughout the country but some of the specificities almost certainly apply elsewhere.³ The demographic regime was typified by low(ish) fertility⁴, largely a function of the monogamous nuptiality regime, and unusual patterns of mortality differentials. Higher status, wealthier, Tuareg children had much higher mortality than Bella children. Tuareg women had higher mortality than Bella women but the opposite was the case for adult men (Randall 1984). Although extra marital childbearing was more acceptable for Bella, overall their fertility was similar to that of Tuareg (Randall and Winter 1985).

The economic and social role of women had had a major impact on the demographic regime (Randall 1984, Fulton and Randall 1985). Traditionally, high-status women in this region did little domestic or livestock related work, made possible by the existence of the dependent Bella population. Differences in behaviour were reinforced by force feeding rich, high status girls and young women and their subsequent obesity seriously limited their physical activity (Randall 2009; Randall in press). Tuareg women were expensive to maintain, often contributing little to the household economy, housework and even childcare. In the quasi-total absence of access to effective health services, childcare patterns were at least partially responsible for the differential mortality rates between social classes (Randall 1984; Hill and Randall 1984).

Nevertheless there was substantial diversity over both time and space. The extent of both force-feeding and slavery had been declining for at least two decades before the 1981-2 demographic surveys, but in the study populations both were still quite frequent. Elsewhere in Mali, Kel Tamasheq had become less nomadic after herd loss in the 1973 drought and the domestic slave

³ The Bella proportion of the population was always much higher in the more southern Tamasheq populations (reaching more than fifty per cent), which included the Gourma and Delta populations surveyed. In the far north of Mali, there were few Bella and Tuareg women were more physically and economically active.

⁴ Total Fertility Rate between 5 and 6 compared to over 7 for other rural Malian populations.

population had declined with Bella moving to urban areas, becoming independent herders or turning to agriculture. In the 1980s there was a tiny urban minority of educated Kel Tamasheq, but in both the populations studied in 1981-2 everyone was nomadic, few had been to school and there was little contact with health services. Most people lived in relatively small, isolated camps (twenty-fifty people) and although men had contact with the outside world through travel and markets, most women led very socially restricted lives.

Results

For all Kel Tamasheq spatial mobility was an integral part of the pastoral production system. In the early 1980s households moved as units and lived in tents or temporary straw huts all year round. Camps moved every few days in the wet season and every month or two in the hot dry season when they had to remain near a water source. Much individual mobility was independent from camp movements. In the wet season young male herders took groups of animals to distant pastures or salt licks. In the hot season animals had to be herded huge distances daily either to water or to pasture. Many children, mainly Bella, took donkeys many kilometres daily for water. At certain times of year some Bella left to go and work on harvests elsewhere in Mali, and some young Bella men went on labour migration to Abidjan and other coastal towns.

Within this geographical mobility there was also substantial residential mobility. Households would leave one camp and join another. Individuals within households moved between camps on visits, especially young unmarried men and children (Randall 2005). Young mothers with children would go on prolonged (several months) visits to their natal home to give birth. Marital breakdown was frequent and children often switched between different households, relatives and camps. These multiple mobilities cannot be broken down in terms of their impact on health but clearly this was a population where mobility permeated all aspects of physical and social life.

Yet, within this highly spatially mobile population, force-fed, obese, high status women whose days were spent sitting or lying in their tents or under a nearby tree were physically amongst the least mobile individuals imaginable. Their value system prioritised obesity and visible immobility. These women walked with difficulty and extremely slowly; when camps were not moving they walked very small distances from their tents, and during transhumance they sat motionless on camels or oxen. There is thus a paradox of immobility within mobility. It is this immobility which appears to have had substantial detrimental health implications both for the women and their children, contributing to the high adult female and child mortality amongst Tuareg relative to Bella.

In 1991 this nomadic pastoral population encountered a new mobility – a forced migration across an international frontier – and then forced spatial immobility in refugee camps. At one level the refugee camps represented little change from their former life style in that, at first, people continued to live in tents, although later many constructed houses. However the changes, of which immobility was just one aspect, were profound and stressful. Oral testimonies suggest the flight was very traumatic and ten years later many women broke down when recalling what had happened. Descriptions of refugee camp life indicate that people adapted to these new, immobile conditions to the extent that many were reluctant to be repatriated and many vowed not to return to a nomadic life once they had returned to Mali. There are many complex reasons behind this change of attitudes: loss of dependent Bella labour was critical because Tuareg women would now have to do the hard work of striking camp and moving. The potential comforts and material possessions of a sedentary lifestyle were now appreciated. The resumption of mobility during repatriation was recalled as being a very stressful period. A decrease in births a year later provides reinforcing evidence for stress (Randall 2004). Maybe transition periods between different lifestyles, whether from mobile to immobile or vice versa, are the most critical for health and well-being rather than a general impact of physical mobility on welfare.

At the time of the 2001 survey there was substantial heterogeneity with respect to lifestyle mobility. Many Tamasheq households had largely abandoned the previous nomadic lifestyle and were sedentary for all or part of the year, although about half the population still transhumed with their animals in the wet season; many men were frequently off herding the remaining animals. Some households remained nomadic, including a few who had never fled to the refugee camps and had been highly mobile throughout the rebellion, hiding in the dunes and mountains to the north. Production-system-determined mobility for the whole population was much reduced but different forms of mobility were emerging, especially for young unmarried women. Not only were few young women fat in 2001 but their increased bodily mobility has contributed to greater social and spatial mobility for this formerly highly restricted group. Young women constantly visit friends and relatives in other camps and sites (often walking quite long distances), continuing the patterns of extensive social life initiated in the densely populated refugee camps where young people's social life was seen as one of the many advantages of camp-life (by them, if not by the older generation). Young women are maintaining this freedom in the post-repatriation life. Marital breakdown (another form of mobility) remains frequent, with attendant child movements.

In 2001 people were still deciding where to live, with whom and with what lifestyle. The new decentralised political system added an additional dimension to such decisions. Some who had been nomadic since repatriation had just decided to stay in one place; others who had been sedentary resumed transhumance. Households who had settled in one community on repatriation moved elsewhere. Post rebellion, mobility thus remains essential but is managed differently (Giuffrida 2005).

Mobility, Morbidity and Mortality

Apart from personal observations no health data are available for these populations either in 1981/2 or in 2001. Health is assessed indirectly from mortality data from both surveys. The 1989 health behaviour study (Randall, Diakite and Pairault 1989; Randall 1993) did not generate morbidity or epidemiological data, but does provide insights into the interplay between the health and mobility of a traditional, isolated nomadic Tamasheq population.

Both surveys include birth histories from reproductive age ever-married women, and orphanhood questions for estimating adult mortality; sibling survivorship was asked in 2001. Data quality is problematic. In 1981 age was a totally irrelevant concept and age data were poor despite substantial efforts by the interviewing teams and the development of local calendars. Age reporting was somewhat better in 2001. Nevertheless this was a population who had been through a rebellion, massacres and forced migration, who had long been marginalised and associated censuses with taxation. Absolute age remains unimportant and people do not like talking about dead children. Neonatal mortality was underreported in 1981, rather less so in 2001. Comparisons with national Malian data will use indirect estimates which control for underreporting although DHS data are also likely to include underreporting. Comparative period mortality rates use uncorrected birth history data because the interest is here within-population differentials and we assume that underreporting does not vary by mobility.

Although in 2001 Kel Tamasheq were more sedentary than in the 1980s, some remained nomadic all year round, and more were semi-nomadic. Even those people who claimed to have been sedentary since the rebellion still moved considerably. Unfortunately the data do not allow for time variant analysis in order to establish whether children are more likely to die at times when they are transhuming or settled. One problem is the complexity of movements. Faced with individuals who moved constantly during the last fifteen years, transhuming,

herding, in and out of refugee camps,⁵ in and out of villages, men who fought with rebel groups, men who trained in Libya, children moving between mobile, sedentary and refugee camp households, the range of experiences would have been impossible to record and attempts to do so would have antagonised interviewees who rapidly become frustrated when faced with demands for chronologies. Therefore simplified data on ‘way of life’ were collected for each individual for four periods:

Before 1985 Before the drought which decimated the herds and initiated some sedentarisation

1985-90	Between the drought and the rebellion
1991-96	During the rebellion
1997+	Since repatriation

For each period we asked whether the predominant way of life during that time for the respondent had been

- (1) Nomadic (moving with animals throughout the year)
- (2) Semi nomadic (moving with animals for less than half the year)
- (3) Sedentary in a ‘site’ – a Tamasheq sedentarised community
- (4) Sedentary in a multi-ethnic village
- (5) In a town
- (6) In a refugee camp

Such a classification was simple to ask about and most people had no difficulty in answering. It is unable to take account of those with complex itineraries and only records the dominant lifestyle. For example, although those in the southern zone surveyed fled to the refugee camps in 1991, in the more northerly areas many left in 1993 or 1994; yet all who fled would be recorded as being ‘refugee camp’ during 1991-96. These ‘way of life’ data show that the vast majority of the surveyed adult population were nomadic before 1985 and about 15 per cent sedentarised after the drought. About 90 per cent went to the refugee camps and four years after repatriation, about half were sedentary, 15 per cent semi-sedentary and 35 per cent nomadic (Randall and Giuffrida 2006).

⁵ During the exile in Mauritania many extended families split with one part in the refugee camp collecting rations and other resources and another part remaining nomadic with the animals in the neighbouring area. Individuals often moved between the two states. Furthermore some people (usually young men) left the remote refugee camps to work in Mauritanian towns

Child Mortality Differentials

Indirect estimates of child mortality by class (figure 2) show that in the 1970s Tuareg mortality levels resembled those of rural Mali, whereas Bella mortality was substantially lower. This pattern was reflected in the 1982 survey in the Gourma (not shown) undertaken with a different research team (themselves mainly Bella), suggesting that these substantial and consistent social class mortality differentials are real and not a function of underreporting (Hill and Randall 1984). Estimates for the whole Tamasheq population in 2001 and for the Tuareg (who were the majority in the refugee camps) show a clear improvement in mortality over time.⁶

One can draw several conclusions from figure 2. Firstly the substantial social class mortality differentials in the 1970s suggest that population mobility played little role in determining mortality. Both the Tuareg and Bella surveyed were highly mobile and lived in the same mixed camps. Any mortality differences must be attributed to a combination of varying susceptibility and different child care patterns (Hill and Randall 1984; Randall 1984) with their origins in the class prescribed roles and values of women and the frequent obesity (and immobility) of Tuareg women. Secondly the similarity in mortality levels between the Tuareg and sedentary rural Malian children downplays the role of mobility in determining mortality. The DHS sample excluded the rural pastoralist northern part of the country, and no nomadic groups were included in the sampling frame (République du Mali, 1987). At that time the health and immunisation services provided in rural Mali were minimal, whether for nomads or sedentary populations.

The relationship between Tuareg mortality levels and that of rural Mali changed substantively in the 1990s, with Tuareg mortality declining much more rapidly than in rural Mali: by 2000 Tuareg child mortality was much lower. This is surprising because whereas the rest of Mali was peaceful during this decade, and

⁶ The 2001 Bella estimates are both irregular and unrepresentative because Bella were only 20% of the population in 2001 and were unusual Bella in that they had chosen to continue living in mixed communities. They included a few servile Bella, now paid. They are included for completeness.

Figure 2: Indirect estimates of Tamasheq childhood mortality 1965-2000

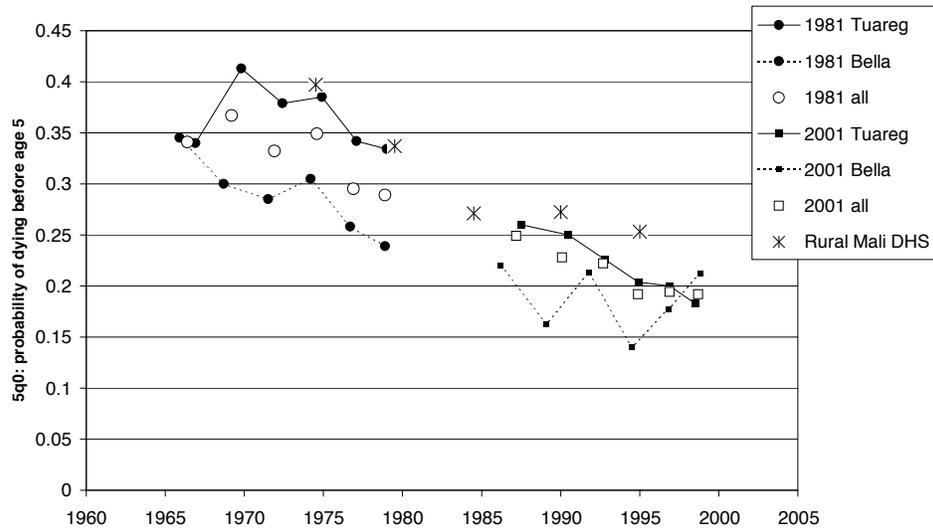
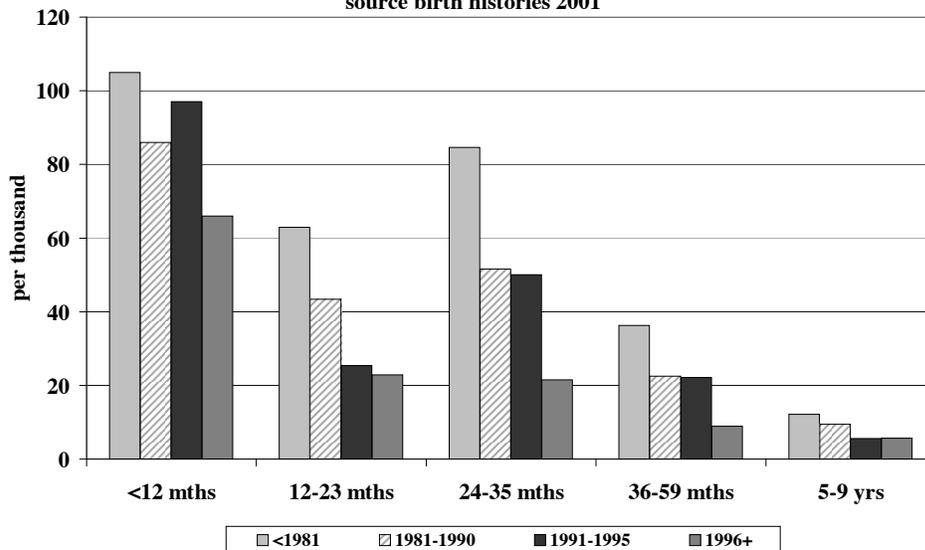


Figure 3: Tamasheq reported infant and child mortality by period: source birth histories 2001



experienced substantial economic growth and the first democratically elected government, the Tuareg suffered a vicious rebellion, massacres, persecution, exile to refugee camps, and repatriation after substantial economic hardship and livestock loss alongside a complete overturning of their traditional way of life. Yet their infant and child mortality has declined considerably.

Impact of Events and Crises on Mortality

Direct measures of mortality from birth histories allow a more precise examination of the impact of specific events on mortality and the investigation of the role of different mobilities within this population. From the directly calculated period mortality rates for different ages for the whole population (figure 3), the mortality decline generally stalled during the rebellion and infant mortality increased. For all age groups, mortality had declined significantly during the 1980s compared with the previous decades, suggesting that neither mobility, nor the 1985 drought and its concomitant social and economic crisis, had long-term deleterious impacts on mortality.

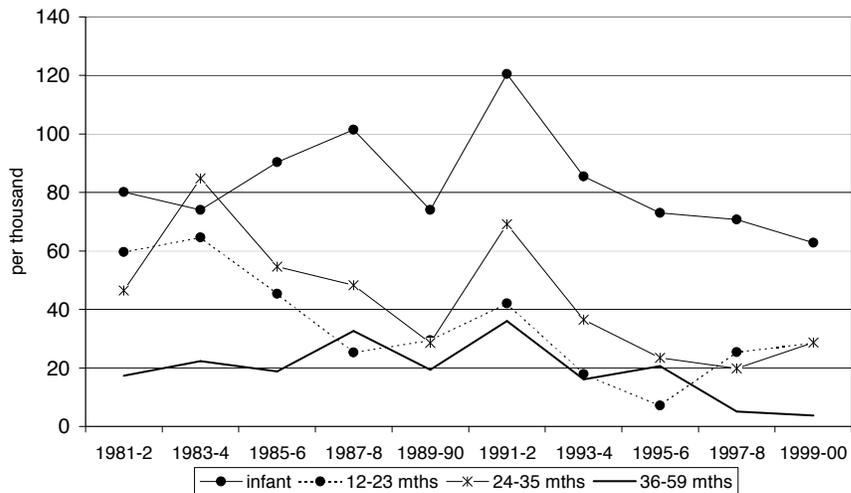
The impact of the forced migration and the period in the refugee camps stands out as an interruption to this general decline. Biannual period mortality rates (figure 4) show that mortality increases were entirely concentrated in 1991-2, the initial period of flight and the early refugee camps. By all accounts this early camp period was chaotic. The remote area in Mauritania where people fled had no infrastructure and required a three hour drive over appalling terrain from the end of Mauritania's long arterial road. At first the camps were disorganised, there were problems with sanitation and water supply and there were epidemics, particularly of measles (where children of all ages were probably susceptible because of previous mobile, low population density living). It was not until medical NGOs arrived, initiated immunisation and set up health clinics that conditions improved. This is a clear case where previously mobility had been an adaptation to potential health hazards, which surged up once people became immobile. The real problem was not the immobility but the high population density and the underlying conditions. After the initial two years in the refugee camps, mortality at all ages declined and the fact that Tuareg infant and child mortality is now well below the national level in rural Mali can probably be attributed to social and attitudinal change induced by the forced immobility in the refugee camps.

Access to Health Care

In the 1980s most nomadic Tuareg had little contact with the health services and the service provision in their areas was extremely poor. They rarely used what

was available because of various constraints (Randall, Diakite and Pairault 1989; Randall 1993; Münch 2007): fear, ignorance, lack of cash, dislike of the way they were treated, inconvenience, cultural barriers, distance, and impracticality. Children were not immunised, traditional medicine was often ineffective and serious illness went untreated. In the refugee camps, once the health care provision had been established, it developed rapidly so that everyone was immunised, there were free preventative and curative services, ante-natal clinics and medical evacuations for emergencies. The educated, urban Tuareg in the refugee camps, long used to making considerable demand on health services, also influenced the attitudes of their rural kin. Literate people were trained as midwives and primary health care workers in order to improve health services on repatriation. Thus the immobile period in refugee camps persuaded Tuareg of the benefits of modern health care whilst removing many of the practical barriers such as cost, distance and mobility. The relative ease of childhood immunisation was probably a critical factor in the substantial declines in child mortality since 1992.

Figure 4: Kel Tamasheq infant and child mortality for 2 year periods: source birth histories 2001



After repatriation rural Kel Tamasheq were more inclined to use health services with the locally trained health workers much in demand, although problems remained with drug supplies and payments. There was improved recognition of conditions for which modern health care is acceptable and effective and an increased willingness to actually seek out care. Herein lies an irony. When Kel Tamasheq lived a nomadic lifestyle there was little willingness to actively seek out modern health care, even when it was available. An apparent consequence of a lifestyle permeated by movement and change was a widespread acceptance of chance, luck or serendipitous encounters. In the Gourma in 1989 if someone fell ill and there happened to be a traditional healer or the mobile Norwegian health clinic nearby, people would seek treatment. However they rarely specifically sought out either modern or traditional health specialists that were any distance away, although there were occasional exceptions, especially for mental health problems. The general principle of health care was to use whatever was locally available; be that foods, plants, animal urine, a knowledgeable old woman or a Norwegian doctor.⁷ If the resource was not there, then fate had not meant it to be used. Mobility was rarely used to exploit sparsely distributed health care resources, despite the availability of animal transport and complete acceptance of mobility as the strategy for accessing other patchy resources such as water, pasture and wild foods. It has required sedentarisation and a loss of mobility to induce a change in Tamasheq mind set and a new willingness to move and seek care.

The reduction in mobility and the regrouping of people in sites since repatriation facilitated other health related activities. In 2001 almost everyone had access to well or bore-hole water, and even nomads usually camped within reach of a settled community's water supply. Generally only young male herders continued to transhume into the delta (where the water quality remained appalling), instead of complete families with women and children. Immunisation campaigns were better received and higher population density, settled communities and new roads had overcome many of the logistic problems. However even the groups who remained nomadic during the rebellion and since repatriation were now much more aware and demanding of health services. The whole population (men and women) have new attitudes towards their health rights and expectations.

⁷ This exploitation of chance encounters includes researchers and interviewers who were plagued for medicines in almost every camp we visited.

Changes in Exposure and Susceptibility

Other consequences of the forced migration impacted upon health. The substantial herd loss has reduced the necessity for extensive familial nomadism, but even richer households altered their herding strategies and few complete households spent the dry season in the ethnically mixed and insalubrious inner Niger delta, preferring to stay all year round in the dryer lands north and west of the delta. There is a political dimension to this change, including persisting mistrust of other Malian populations who turned against them during the rebellion (Randall and Giuffrida 2006), but the decision to remain in the dry lands has substantial health benefits. Alongside the appalling delta water supply, living on a flood plain entailed permanent exposure to malaria and other water borne and water based disease. In the 1981 surveys other populations living in the delta had significantly higher mortality than the, generally poorer and more isolated, people from the same ethnic groups, living elsewhere in semi-arid areas (Hill and Randall 1984).

A further critical change influencing child health is the combined impact of the 1985 drought and forced migration on women's roles, values and health. Whereas in 1981 many reproductive aged Tuareg women had been force-fed, were obese, complained of numerous health problems and delegated most childcare to young Bella girls, in 2001 there were few fat women and all women were more active because most of the dependent Bella labour force had quit. These changes have multiple causes: poverty through livestock loss, the forced migration where Bella were not persecuted and where obese women were a serious handicap, and general social change and attitudes to dependent servitude. Tuareg women are much more actively involved in childcare now, there is more continuity of care, more concern with cleanliness and washing children and a greater awareness of the health status of children. Thinner women are probably healthier during pregnancy too. These changes in women's roles and relationships with children were not induced by changes in mobility but were part of all simultaneous transformations.

Is Mobility Disadvantageous?

Some Tamasheq sub-groups remained nomadic and highly mobile throughout the 1980s and 1990s. The nature of pastoral nomadism means that such groups were unlikely to have had short periods of other lifestyles during each time period (because their animals perpetually require mobility). During the rebellion period these groups were not only highly mobile, hiding in the dunes and mountains, but also totally unable to access any health services, and thus they provide a good test of whether mobility itself is detrimental to child health.

Using birth history data the mother's 'way of life' was ascribed to the child under the assumption that the child generally resides with its mother, an assumption which, despite child mobility, is fairly robust up until the age of five. For all births since 1991 (i.e. since the beginning of the rebellion and including the most traumatic periods of the rebellion for the earlier births) survival analysis was undertaken for four categories of children: (1) Always mobile: mothers were mobile throughout their lifetime (18% born before 1996). (2) Always fixed: mothers sedentary throughout lifetime (6.2% born before 1996). (3) Refugee then mobile: born in refugee camp, mobile since repatriation (all born before 1996). (4) Refugee then fixed: born in refugee camp then sedentary after repatriation (all born before 1996).

Because most people were in the refugee camps these groups are not strictly comparable; the majority of children with stable lifestyles were born since repatriation. Separate analysis was therefore also done for children born 1991-6. For births during 1980-90 three categories were defined: (1) Always mobile: mothers nomadic throughout period (39% born before 1985). (2) Always fixed: mothers fixed throughout period (24% born before 1985). (3) Mobile then fixed: mothers sedentarized after 1985 drought (all born before 1985).

Table 1: l_{60} (proportion of births surviving to age five) for different categories of mobility in different time periods

	l_{60}	N	Distribution of births over period	Comments
Births 1980-1990				
1. always mobile	.796	1321	spread out	1 vs 3: p=0.04
2. always fixed	.755	286	later	all others not significant
3. mobile then fixed	.704	81	earlier	
Births 1991-2001				
1. always mobile	.882	747	later	1 vs 2: p =0.035
2. always fixed	.853	695	later	1 vs 4: p=0.013
3. refugee + mobile	.864	317	earlier	all others not significant
4. refugee + fixed	.834	493	earlier	
Births 1991-1996				
1. Always mobile	.902	245	na	1 vs 2: p=0.005
2. Always fixed	.808	167		1 vs 4: p=0.016
3. Refugee + mobile	.864	317		all others not significant
4. Refugee + fixed	.834	493		

Because of the general mortality decline over time we expected those groups with more children born earlier in the period to have higher mortality. Since births in the later 1980s experienced some of their early years during the period of flight, births 1980-88 were also investigated but outcomes were identical (not shown).

There are limitations to this analysis, not least the different time distributions of births and the crude classification of lifestyle. Nevertheless, with respect to mobility, survivorship is always significantly better for children who remained mobile throughout the whole period, whether during the rebellion or before. Even where the differences are not statistically significant they are always in favour of the more mobile groups (for those born in refugee camps, mobile children post repatriation had lower mortality than fixed children).

Discussion

These results can be interpreted in various ways. Mobility could bring with it more benefits in this particular environment than sedentism, suggesting that the exposure and susceptibility determinants are more important for child mortality than access to health care, and that the benefits of mobility outweigh the disadvantages. Or these results could just represent a selection bias. Mobile households have retained enough animals to warrant mobility; the sedentarized include the destitute but also wealthy leaders and most of the educated Tuareg. Against this argument is the clear evidence from the 1981 surveys that, for this population, wealth and power did not then translate into better child survival.

Analysis of Tamasheq child mortality suggests that mobility itself is not detrimental to child welfare, but the transformation from one lifestyle to another may be associated with increased risk of dying. This in itself is not surprising since people often only transform their lifestyle from one practised for generations if they are forced to through necessity. Much, but not all, of the sedentarization in the mid 1980s was forced owing to drought-induced poverty or destitution. The numbers of children in this category are small but they experienced the highest mortality. The increased mortality in the early 1990s was certainly associated with the forced migration followed by enforced immobility in the refugee camps.

It is the interplay between mobility and immobility that renders this case interesting but which also suggests that one can only understand the impact of mobility on health for any specific population or sub-group through a detailed consideration of the three critical intervening factors: exposure, susceptibility and care. In the 1970s Tamasheq mortality was high, as was mortality elsewhere

in rural Mali. Within the nomadic Tamasheq population mobile Tuareg had much higher mortality than equally mobile, but poorer and powerless, Bella. Exposure to disease amongst these two groups was almost identical: they lived in the same camps, drank the same (appalling) water, and ate much the same food, although Tuareg children consumed more dairy and animal products (usually considered to give a nutritional advantage rather than disadvantage). Susceptibility to disease, particularly malaria, may have been lower amongst the Bella whose black African origins may have conferred higher levels of genetically determined red blood cell adaptations to malaria, although this is speculation rather than built on evidence. In earlier analyses (Randall 1984; Hill and Randall 1984) I suggested that these mortality differentials were probably generated by differential care that children received in terms of continuity of care and the capacity of the carers. The highly obese and immobile Tuareg mothers were both physically unable and mentally disinclined to supervise their children throughout the day; obesity was a physical symbol of women's access to servile Bella labour. Tuareg women without Bella were unable to be obese. However the Bella carers of Tuareg children were usually children themselves and probably not very attuned to their charges' needs, nor able to fulfil them. In contrast, Bella children, until toddlerhood, spent most of their time with their mothers. They were washed more frequently, because their mothers fetched the water; they had access to food throughout the day because their mothers did the cooking. These small differences in daily care, in the absence of modern medicine, probably contributed to the substantial observed mortality differentials. This argument suggests it was the physical personal immobility of the Tuareg mothers compared with the active Bella mothers that generated child mortality differences.

This interpretation is corroborated by the mortality patterns observed since the rebellion. Mortality amongst Tuareg children has declined substantially, partially attributable to immunisation in the refugee camps and changing access to health care. However a major consequence of both drought and conflict was the loss of the remaining dependent Bella labour. Thus previously fat Tuareg women can no longer be as obese because they must do more domestic labour and few households have the livestock for surplus milk and butter to maintain obese women. A final twist emerging in the refugee camps is that young women no longer seek obesity. People would still prefer to be fatter rather than thinner but not to the degree of obesity that was desirable in the 1980s. Thus a combination of circumstances and changes have made formerly immobile women of reproductive age more physically active and more involved in the day-to-day care of their young children. This development of personal mobility in a context of changing spatial and geographical mobility may well be the major contributor to the observed Tuareg child mortality decline.

Mobility is a complex, multi-faceted concept for all populations, but for the Kel Tamasheq the diversity of forms and dimensions of mobility surpasses most other groups. The different comparisons undertaken in this paper allow some insights into the potential impact of mobility on health. Tamasheq-rural Mali mortality comparisons demonstrate that mobility alone contributes little to our understanding of mortality differentials and a nomadic lifestyle is not necessarily disadvantageous. Comparing within Tamasheq sub-groups – Bella and Tuareg in 1981, nomadic, sedentarised and refugees in the 1990s -- reinforces this interpretation. Understanding mobility and its diverse impacts and influences on a population may contribute to our general understanding of factors contributing to health and welfare of children, but this research provides no evidence that spatial mobility per se can be considered a determinant of health. Nevertheless, wider conceptualisations of mobility do allow us to consider determinants of child health that are unlikely to be captured through standard socio-demographic variables and analysis. Personal mobility and how it is constructed and maintained, and the relationship between personal and geographic mobilities are important dimensions of Tamasheq child mortality dynamics.

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