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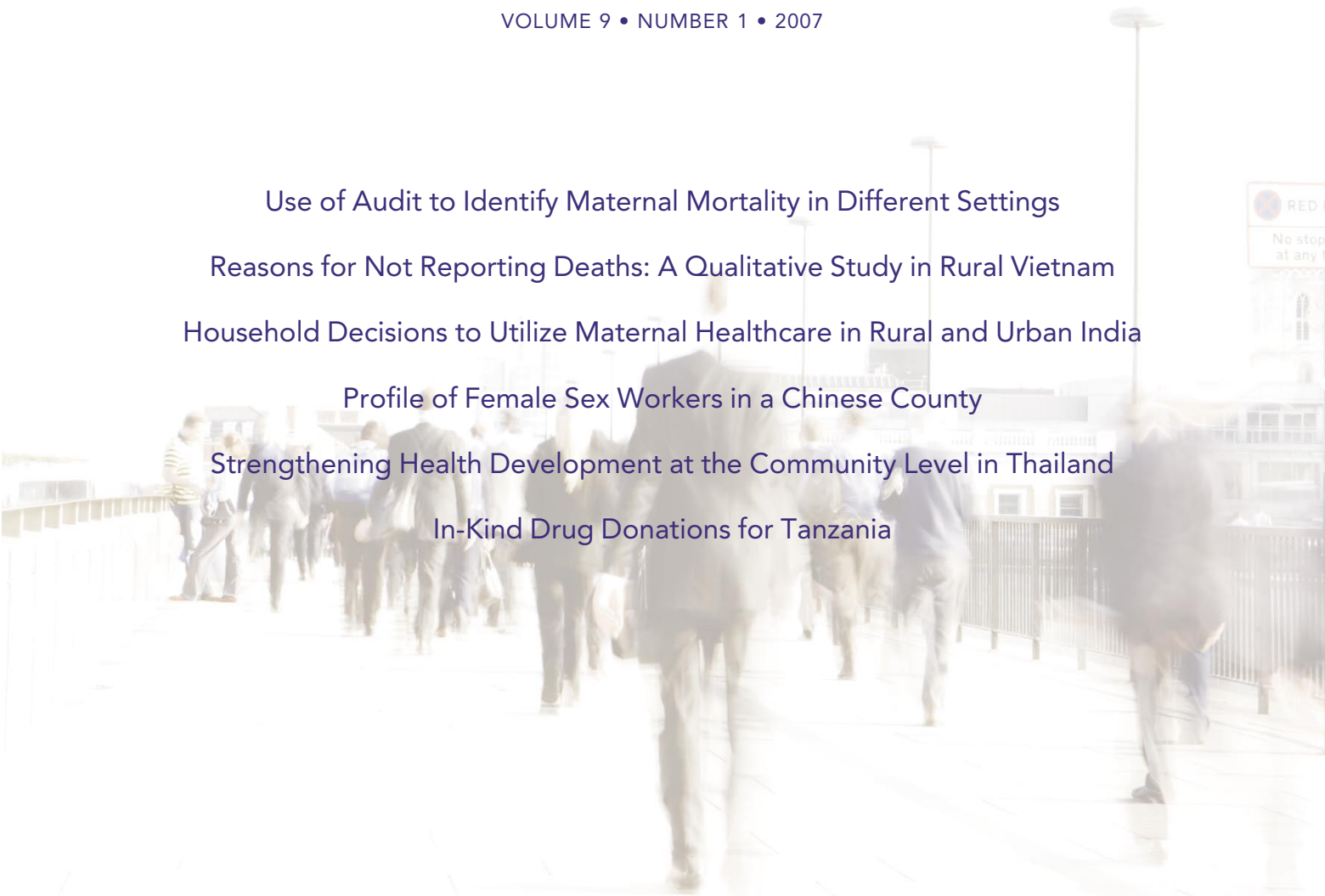

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Founded and edited by members of the Department of Health Policy and Administration, School of Public Health, University of North Carolina at Chapel Hill.

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To discuss supplements or other publishing issues contact Anton Hart at 416-864-9667, ext. 109 or by e-mail at ahart@longwoods.com.

Editorial Director
Dianne Foster-Kent
E-mail: dkent@longwoods.com

Managing Editor
Rebecca Hart
E-mail: rhart@longwoods.com

Publisher
W. Anton Hart
E-mail: ahart@longwoods.com

Associate Publisher/Administration
Barbara Marshall
E-mail: bmarshall@longwoods.com

Associate Publisher/Media
Susan Hale
E-mail: shale@longwoods.com

Director, Design and Production
Yvonne Koo
E-mail: ykoo@longwoods.com

Graphic Designer, Design and Production
Jonathan Whitehead
E-mail: jwhitehead@longwoods.com

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From the Editor-in-Chief

The papers presented in this issue of World Health & Population (*WHP*) represent diverse public health-related projects and issues in Africa, India, China, and Southeast Asia. Although these papers have inherent differences, there are also some interesting threads and commonalities, both in methods and subject matter.

"Use of Audit to Identify Maternal Mortality in Different Settings" by van Dillen, Stekelenburg, et al. examines the maternal mortality rate in the context of three African countries (Gambia, Namibia, and Zambia), and Netherlands. Although hospital audits or chart reviews are not a substitute for proper sample surveys, they can provide both important clinical direction as well as political support for addressing the critical public health and societal problem of avoidable maternal death. The authors put the issue in the context of United Nations Millennium Development Goal (MDG) 5, to reduce maternal mortality by 75% by 2015, and the HIV/AIDS epidemic, which negatively affects maternal health "through a cascade of interrelated factors." Their analysis shows that generalizations regarding just high and low country economic status is inadequate to explain either the level or the predominate correlates of high maternal mortality, and that audits can be appropriately used to develop local will and local solutions.

"Reasons for Not Reporting Deaths: A Qualitative Study in Rural Vietnam" by Huy, Johansson, and Long offers very interesting insight into the intersection of religion, culture, and public health. Accurate mortality measurement is foundational in understanding a society's level of health and development. When socio-cultural factors and belief systems result in either systematic underreporting of deaths or, as Huy et al. report, differential underreporting of deaths by age or other factors, then assessments or policy decisions based upon these data could be seriously mis-informed. Critical areas of differential underreporting discussed in the article include: (1) infant mortality, where deaths of very young infants may be overlooked because of a belief that they are "not fully people yet"; (2) HIV/AIDS, where there may be family stigma or shame; and (3) among migrants not registered as residents in the region. Underestimation in any of these three categories could have serious policy ramifications. The authors close by warning researchers against reliance on "verbal autopsy" methods of determining mortality, and encouraging the use of multiple data sources to provide more accurate estimates.

Sisra Sarma and Henry Rempel present an econometric analysis in "Household Decisions to Utilize Maternal Healthcare in Rural and Urban India." Using data from the Government of India National Sample Survey they look at factors such as mother's schooling, awareness of services, and accessibility on the maternal healthcare utilization decision. Accessibility is considered in terms both of distance to the nearest facility, as well as the availability of public transport. As with the van Dillen et al. paper, Sarma and Rempel also put the issue in the context of MDG 5 to reduce maternal mortality by 75% by the year 2015. Conclusions from the analysis include addressing both demand side issues in terms of improved educational activities directed toward pregnant women, and supply side issues in terms of reducing access barriers.

The paper by Fang, Li, et al. "Profile of Female Sex Workers in a Chinese County" is a continuation of the excellent series of articles published by this group of authors in *WHP*. (See also *WHP* 8:2 and 8:3) Continuing their theme of investigating and identifying critical rural-urban health differentials in China through both empirical and qualitative research, the authors show significant sexual and health behavior differences between sex workers who migrate to urban areas, versus those who normally reside there. Relating this to the growing incidence and prevalence of HIV in China they advocate for more effective prevention and intervention programs, particularly in the remote, rural areas from which a substantial portion of the sex workers originate. Although more research is needed, it is likely more cost effective to reach this population earlier and before migration.

Moving from measurement to management, "Strengthening Health Development at the Community Level in Thailand" proposes steps to encourage local management of health development. Researchers from Chonburi University in Thailand, and the University of Porto in Portugal carried out a qualitative, focus group data collection design, and developed a very interesting model on the process for strengthening health development by community mobilization. This article will be of particular interest to the health behavior/health education readers of *WHP*.

The last offering in this issue is study related to supply of pharmaceuticals in Tanzania. Like many resource-constrained economies, Tanzania relies a great deal on donated pharmaceuticals to meet its essential health care needs. "In-Kind Drug Donations for Tanzania" by Mariacher and Mtasiwa is a descriptive study based upon a mail survey of stakeholder knowledge and perceptions in this area. Although nearly all respondents agreed on the critical importance of drug donations, there were also many helpful insights regarding ways to better improve communication, coordination, and efficiency.

Finally we should note that all of these papers demonstrate the positive and fruitful collaboration that *WHP* encourages between researchers from the countries in which the research is being conducted, and collaborators at North American or Western European universities/research institutes. This kind of collaboration is particularly useful, we believe, in furthering the mission of *WHP* "to explore ideas, share best practices, and enable excellence in healthcare worldwide." The editors and publishers of *WHP* are always interested in any comments or suggestions you might have on the articles or journal. Please feel free to write or e-mail us.

John E. Paul, PhD
Editor-in-Chief, *World Health & Population*
paulj@email.unc.edu

The Use of Audit to Identify Maternal Mortality in Different Settings: Is It Just a Difference Between the Rich and the Poor?

Jeroen van Dillen, Department of Obstetrics, Leiden University Medical Centre, The Netherlands, Email: gwamupanda@caiway.nl, J.J.M.van_Roosmalen@lumc.nl

Jelle Stekelenburg, Department of Obstetrics and Gynaecology, Isala Klinieken, Zwolle, The Netherlands, Email: jelle.stekelenburg@wanadoo.nl

Joke Schutte, Department of Obstetrics and Gynaecology, University Medical Centre Groningen, The Netherlands, Email: jokeschutte@yahoo.com

Gijs Walraven, Secretariat of His Highness the Aga Khan, Aiglemont, France, Email: Gijs.WALRAVEN@aiglemont.org

Jos van Roosmalen, Department of Obstetrics, Leiden University Medical Centre, The Netherlands, Email: gwamupanda@caiway.nl, J.J.M.van_Roosmalen@lumc.nl

Correspondence: Jeroen van Dillen, MD, Department of Obstetrics and Gynaecology, Leiden University Medical Centre, Albinusdreef 2, 2333ZA Leiden, The Netherlands, Email: gwamupanda@caiway.nl

Abstract

Objective: To illustrate how maternal mortality audit identifies different causes of and contributing factors to maternal deaths in different settings in low- and high-income countries and how this can lead to local solutions in reducing maternal deaths.

Design: Descriptive study of maternal mortality from different settings and review of data on the history of reducing maternal mortality in what are now high-income countries.

Settings: Kalabo district in Zambia, Farafenni division in The Gambia, Onandjokwe district in Namibia, and the Netherlands.

Population: Population of rural areas in Zambia and The Gambia, peri-urban population in Namibia and nationwide data from the Netherlands.
Methods: Data from facility-based maternal mortality audits from three African hospitals and data from the latest confidential enquiry in the Netherlands.
Main Outcome Measures: Maternal mortality ratio (MMR), causes (direct and indirect) and characteristics.
Results: MMR ranged from 10 per 100,000 (the Netherlands) to 1,540 per 100,000 (The Gambia). Differences in causes of deaths were characterized by HIV/AIDS in Namibia, sepsis and HIV/AIDS in Zambia, (pre-)eclampsia in the Netherlands and obstructed labour in The Gambia.
Conclusion: Differences in maternal mortality are more than just differences between the rich and poor. Acknowledging the magnitude of maternal mortality and harnessing a strong political will to tackle the issues are important factors. However, there is no single, general solution to reduce maternal mortality, and identification of problems needs to be promoted through audit, both national and local.

Introduction

Worldwide, a woman dies every minute as a result of complications arising during pregnancy, childbirth and puerperium. All these cases represent a personal, familial and social tragedy. According to the Millennium Development Goals (MDG) formulated by the United Nations in 2000, maternal mortality should be reduced by 75% by 2015 compared with 1990 (MDG5 – UN 2005). Maternal mortality, however, is notoriously difficult to measure. This is especially true since 99% of the estimated 529,000 annual maternal deaths occur in low-income countries where vital statistics are lacking (AbouZahr 2003). Without data on the dimensions, impact and significance of a health problem, it is not possible to create an advocacy case or establish strong programs to address it.

Especially in sub-Saharan Africa, often the only information available on maternal mortality is hospital-based data. In many low-income countries, only a small proportion of births and maternal deaths occur in health facilities. Low utilization of maternal health services, which is usually caused by a combination of different factors, can contribute to high maternal mortality (Stekelenburg et al 2004). On the other hand, hospital data tend to overestimate maternal mortality in the community (Walraven et al 2000). In fact, hospital maternal mortality is expected to exceed community rates, if the hospital functions well as an integral part of a primary healthcare network to which women with high-risk pregnancies and complications are referred.

Conducting a facility-based maternal death review is primarily an educational process for health professionals providing care to pregnant or recently delivered women (WHO 2004). Furthermore, a facility-based maternal death review is only complete if linked with proper, feasible recommendations to improve maternal care and services.

Auditing hospital data, although not useful for estimating maternal mortality in the community, provides detailed information about the underlying causes of death and substandard care factors and can be used in strategies to reduce maternal mortality. An important additional advantage is that the findings can be used by health managers at district, regional, national or international levels to help identify service needs, prioritize resources and raise funds for programs and/or projects to improve maternal health.

Objectives

The primary objective of this paper is to illustrate how maternal mortality audit can be used to identify causes of and contributing factors to maternal deaths in different settings. A second objective is to illustrate differences between low- and high-income countries by presenting data from three facility-based maternal death reviews in sub-Saharan Africa and from the confidential enquiry into maternal deaths in the Netherlands (Schutte et al. in review). Finally, using regional and international differences in relation to historical lessons learned, the paper elaborates on how to reduce maternal mortality as stated by MDG5.

Methodology

Study areas and population

Study sites were selected purposively based on the authors' working experiences (see initials in parentheses).

Zambia (JS). Kalabo District is one of seven districts in Western Province in Zambia, situated on the western side of the Zambezi River. Characteristics of the area are presented in Table 1. During the flood season, six rural health centres are completely cut off from the rest of the District. Adequate access to health services is not provided to all communities. Kalabo District Hospital is the main referral hospital in the district where comprehensive emergency obstetric care is available on most occasions. Maternal mortality in the hospital is high, as in most rural areas of Africa, with far more than 1,000 maternal deaths per 100,000 live births.

Table 1. Selected indicators for the four countries and characteristics of study areas/hospitals

Country indicators[a]	Zambia	The Gambia	Namibia	Netherlands
GDP per capita (USD)	877	1,115	4,934	28,983
Life expectancy at birth (years)	37	59	49	78
Literacy rate (%)	68	38	85	99
Health expenditure per capita (USD)	49	46	331	2,564
People living with HIV/AIDS (% age 15–49)	16.5	1.6	21.3	0.2
Skilled attendance at delivery (%)	43	55	76	100
Study area/hospital	**Kalabo**	**Farafenni**	**Onandjokwe**	**Netherlands**
Catchment area (km^2)	17,447	2,256	26,607	41,160
Number of inhabitants	116,003	213,700	152,000	16,000,000
Population density (km^2)	6.6	94.7	5.7	388.7
Study Period (months)	30	12	12	24
Institutional births (n)	1471	1169	3480	409,222[b]

[a]Sources: http://www.who.int/country
http://www.undp.org/hdr2003/indicator
[b]Total births in the Netherlands: institutional + home births.

The Gambia (GW). The North Bank Division is one of seven divisions in The Gambia, situated to the north of the Gambia River. Characteristics of the area are presented in Table 1. Over the last 20 years, there has been a marked change in health service availability in the division. Farafenni hospital, where comprehensive emergency obstetric care is available on most occasions, was established only recently, in 1999. Between 1982 and 1998, the proportion of women delivering in a health facility increased from 4.6% to 18.0%. Again, maternal mortality in hospital is high, with far more than 1,000 maternal deaths per 100,000 live births.

Namibia (JvD). Onandjokwe District is situated in Oshikoto region in the former North West Health Directorate. Characteristics of the area are presented in Table 1. In this semi-rural district, peri-urban areas (like Ondangwa town) are rapidly expanding, and many people settle here in search of work. Onandjokwe District has one hospital, Onandjokwe Lutheran Hospital, where comprehensive emergency obstetric care can be given at any time. According to official records, in-hospital maternal mortality was 21 per 100,000 in 2001, when only one case was reported. Nationally, however, maternal mortality stands at 271 per 100,000.

The Netherlands (JS and JvR). This western European country is bordered by the North Sea, Belgium and Germany. Characteristics are presented in Table 1. In the Netherlands, 409,222 deliveries occurred in 2000 and 2001. Approximately 70% of the births were in hospital; 30% were at home under the guidance of a trained midwife or a family practitioner. Maternal mortality is low, at 12.6 per 100,000 live births in 1993–2002 (Schutte et al. submitted).

Methods

We analyzed maternal deaths in Zambia (January 1999 to July 2001), in The Gambia and Namibia (January to December 2002) and in the Netherlands (January 2001 to December 2002). In the three African hospitals, hospital staff performed the local audit as an integral part of routine clinical work (Stekelenburg and Van Roosmalen 2002). In the confidential enquiry in the Netherlands, audit forms were reviewed by the maternal mortality committee of the Dutch Society of Obstetrics and Gynaecology. We searched for classification of death (direct or indirect deaths), causes of death, substandard care factors (in hospital) and delay factors in all cases of the four series.

Definitions

Maternal death – death of a woman while pregnant or within 42 days of termination of the pregnancy, irrespective of the duration or the site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes (WHO 1992).

Maternal mortality ratio (MMR) – the number of maternal deaths per 100,000 live births.

Direct maternal deaths – those resulting from complications of the pregnant state, from interventions, omissions or incorrect treatment.

Indirect maternal deaths – those resulting from a disease (either previously existing or developed during pregnancy) aggravated by the physiological effects of pregnancy.

Substandard care – care was considered substandard when, according to the local audit team (African hospitals) or the national maternal mortality committee (the Netherlands), it deviated from existing local protocols or consensus.

Delay factor – delay factors included delay in the decision-making process (phase 1), delay in reaching a health facility (phase 2) and delay in receiving appropriate care (phase 3) (Thaddeus and Maine 1994).

Limitations

As previously mentioned, hospital-based mortality data does not necessarily reflect community maternal deaths. Furthermore, even deaths in hospital might have been misclassified as non-maternal, especially indirect deaths in medical wards. Data was recorded retrospectively from patient files, which in some cases were incomplete. On the other hand, audit sessions were done locally, and healthcare workers involved in patient management gave additional information if necessary. Finally,

the definition of substandard care differed between settings according to differences in local protocols and possibilities (e.g., the absence of an intensive care department in Zambia and The Gambia).

Results

Differences in socio-economic indicators between the four study areas and country data are presented in Table 1. A picture of poverty, short life expectancy and poor healthcare arises from the data for Zambia and The Gambia. Namibia is slightly better, with a gross domestic product (GDP) per capita about fivefold and health expenditure per capita about sevenfold compared with Zambia and The Gambia. The situation in the Netherlands can be characterized as wealthy, a long life expectancy and good healthcare.

The distribution in classification between direct and indirect obstetrical deaths does not show a difference between Zambia, The Gambia and the Netherlands (Table 2). In Namibia, however, indirect causes of maternal death were identified in 67% of the cases. As for cause of death, a high percentage of sepsis but no eclampsia cases exist in Kalabo, Zambia. In Farafenni there were no abortion-related cases, while obstructed labour, hemorrhage and sepsis were common direct causes of maternal mortality. Absence of obstructed labour and abortion-related cases and a very high percentage of (pre-)eclampsia-related deaths were the most striking findings in the Netherlands (Table 3). For Namibia and Zambia, HIV/AIDS is a major influence in maternal mortality. AIDS might have been the cause for the "chronic disease" case in The Gambia. Four cases in The Gambia were booked as "unknown," but considered indirect maternal deaths.

Table 2. Characteristics of maternal deaths (numbers, % or range in parentheses)

Characteristics of Deaths	Zambia Kalabo	The Gambia Farafenni	Namibia Onandjokwe	Netherlands
Maternal deaths - Direct - Indirect	15 10 (67) 5 (33)	18 12 (67) 6 (33)	21 7 (33) 14 (67)	48 35 (73) 13 (27)
Maternal mortality ratio	1359	1540	603	10
Mean age in years (range)	25.5 (15–42)	28.1 (17–45)	27.0 (16–40)	29.2 (16–40)
Substandard care	9 (60)	11 (61)	9 (43)	25 (52)
Delay factors	9 (60)	10 (56)	-	1 (2)

Substandard care is prevalent in all hospitals (Table 2). In the Netherlands, the confidential enquiry committee identified substandard care in 52% of cases. In Zambia and The Gambia, substandard care was found in about 60% of cases of maternal death. In Namibia, substandard care was identified in 42%, but this would increase to 67% if a missed family planning opportunity in a known or suspected HIV patient were classified as substandard care.

Discussion

Although the data presented in this paper are not intended for comparing causes of maternal deaths, results from three local African audits and the nationwide confidential enquiry into maternal deaths in the Netherlands illustrate clear differences.

First, they indicate an association between poverty (low gross national product [GNP]) and maternal death (high MMR). This relationship, however, is not straightforward. In countries where the GNP per capita was below USD 1,000 in 1993, estimates of maternal mortality ratios ranged

from 22 to 1,600 per 100,000 live births (Stanton et al. 1995; World Bank 1995). For example, at that time, maternal mortality ratios were estimated at 160, 1,200 and 1,300 in Vietnam, Uganda and Burundi, respectively, despite very similar GNPs per capita (USD 170–180). The main differences in maternal mortality between countries and world regions cannot simply be explained by variations in economic growth (De Brouwere et al. 1998). Also, national figures mask substantial internal variations – geographic, economic and social – which are not confined to low-income countries. Irrespective of the stage of development or the condition of the health system, inequalities in the risk of maternal death are found everywhere (Ronsmans et al. 2006).

Table 3. Causes of maternal deaths (numbers, % in parentheses)

	Zambia Kalabo	The Gambia Farafenni	Namibia Onandjokwe	Netherlands
Direct maternal deaths	10 (66,7)	12 (66,7)	7 (33,3)	35 (72,9)
Hemorrhage	1 (6,7)	3 (16,7)	1 (4,8)	1 (2,1)
(Pre-)eclampsia	0	1 (5,6)	2 (9,5)	12 (25,0)
Sepsis	5 (33,3)	3 (16,7)	1 (4,8)	3 (6,3)
Abortion	1 (6,7)	0	2 (9,5)	0
Obstructed labour	2 (13,3)	4 (22,2)	0	0
Other direct causes				
Thromboembolism	1 (6,7)	0	1 (4,8)	5 (10,4)
Amniotic fluid embolism	0	0	0	5 (10,4)
Other	0	1 (5,6)	0	8 (16,7)
Unknown				1 (2,1)
Indirect maternal death	5 (33,3)	6 (33,3)	14 (66,7)	13 (27,1)
HIV/AIDS	4 (26,7)	0	8 (38,1)	1 (2,1)
Other	1 (6,7)	2 (11,1)	6 (28,6)	12 (25,0)
Unknown[a]	0	4 (22,2)	0	0

[a]Four cases in Farafenni were audited as indirect maternal death with unknown cause. The maternal mortality committee of the Dutch Society of Obstetrics and Gynaecology classifies sudden death of unknown cause as direct maternal death.

Historically, the trend in maternal mortality in Sweden, England and Wales and the United States suggests two main phases (Loudon 1988; De Brouwere et al. 1998). The first phase, in the late 19th century, was characterized by recognition of the magnitude of the problem revealed by vital statistics. This led to professionalization of midwifery care and, together with the introduction of aseptic techniques, reduced maternal mortality in the early 20th century in countries like Sweden, the Netherlands and Denmark to the equivalent of the 25th centile of the poorest countries today. The second phase, which followed the plateau between 1900 and 1930, was made possible by the improvement of techniques such as use of antibiotics, caesarean section and blood transfusion. During this phase, the quality-of-care concept and a system of control was assisted by information from studies into maternal mortality. Vital statistics, although available in Sweden from as early as the 18th century, resulted in confidential enquiries into maternal deaths in England and Wales only from 1949. These enquiries and the medical audit introduced at the same time resulted in awareness among caregivers and largely contributed to further decline until the low rates found today were achieved.

As with the relationship between poverty and maternal mortality, the possible relationship between access to healthcare and maternal mortality is not straightforward. The case of Kalabo, Zambia, demonstrates what happens in a large district (in square kilometres almost half as big as the Netherlands) with only one hospital offering emergency obstetric care and no transport system at all (Stekelenburg et al. 2004). The decentralization of emergency obstetric care has not taken place and is not feasible. However, like Zambia, Sweden was a country with a very scattered (and

poor) population and a very high maternal mortality ratio in the first half of the 18th century. Early recognition of the magnitude of the problem and a strong political will to tackle it led to a decrease to below 100 per 100,000 live births by 1950 (Hogberg and Joelsson 1985). The striking difference in the presence of delay factors in reaching a health facility between the cases of maternal deaths in the Netherlands on one hand, and Zambia and The Gambia on the other, is as expected. Absence of delay factors in Namibia is surprising and can be explained by the quality of the referral system in Onandjokwe district. This plays a role in understanding the absence of obstructed labour as a cause of maternal death in both the Netherlands and Namibia.

Another striking difference concerns the HIV/AIDS epidemic, which plays a devastating role in healthcare in Africa. Halting the spread of HIV is an important goal, summarized in MDG6 (UN 2005). In the studies presented here, HIV prevalence ranged from 0.2% for the Netherlands to 21.3% for Namibia. In Kalabo, Zambia, HIV/AIDS was the cause in at least 4 of 15 (27%) cases of maternal death. Probably, some of the women who died from septicemia were also HIV-positive but were not tested. In Onandjokwe, Namibia, HIV/AIDS contributed to the cause of death in at least 8 of 21 (38%) cases. In the series from Farafenni, The Gambia, the single case of "chronic disease" might have been HIV/AIDS as well. An increase in maternal mortality in HIV-prevalent settings has been reported earlier, with levels up to 22 times as high in HIV-positive women compared with HIV-negative women (Ticconi et al. 2003). At present there appears to be consensus that pregnancy itself does not have a major adverse effect on survival of HIV-infected women (Minkoff et al. 2003). It is clear, however, that in sub-Saharan Africa the HIV/AIDS epidemic negatively affects maternal health through a cascade of interrelated factors such as anemia, susceptibility to infection, comorbidity with other STDs, malnutrition, poverty, shortage of health staff and lower immunity for malaria. Most (African) countries have introduced national and local programs on dealing with HIV in pregnancy. However, massive support is still needed to implement comprehensive reproductive health programs that include (costly) antiretroviral treatment. Finally, in addition to the medical consequences, the HIV/AIDS epidemic has also increased the community's unwillingness to donate blood and has led to a critical shortage of health workers of all cadres in many remote districts (Stekelenburg and Van Roosmalen 2002).

In the Netherlands, (pre-)eclampsia was identified as the largest single cause of maternal death, at 25%. Maternal mortality and morbidity audits have identified the incidence of pre-eclampsia as high in the Netherlands compared to its surrounding countries. This has led to recent changes in national guidelines.

Finally, it is important to note that in all four series the proportion of indirect maternal deaths is relatively high, with figures up to 67% in Onandjokwe (Van Dillen et al. 2006). Indirect maternal deaths are particularly prone to being reported as non-maternal and there are significant differences between countries in the classification of indirect deaths to the maternal category (Schuitemaker et al. 1997; Songane and Bergstrom 2002). The 2000–2002 confidential enquiry in the United Kingdom found for the first time that indirect deaths account for more maternal deaths than direct causes (Lewis and Drife 2004). There is reason to assume that, at least, attention to maternal mortality as a problem has led to increased registration, even of indirect causes. Most countries with confidential enquiries into maternal deaths see an initial increase in registered maternal deaths after the program is introduced, due to improved identification and classification (Schuitemaker et al. 1998).

Conclusion

To achieve MDG5 and reduce maternal mortality by 75%, many factors need to be addressed, among these socio-economic and organizational ones. But there is more than just a difference between rich and poor. The first step in reducing maternal mortality is to identify the problems. Identifying local, regional or national causes, assessing substandard care and recommending improvements can be achieved through the implementation of audit. Audit is a low-cost operational research tool that is not just relevant for monitoring local progress. It should also be used for advocacy and can inform policy makers and planners about effective interventions to reduce maternal deaths. This

paper illustrates that there is no single solution, since every country or region has different factors influencing maternal health.

Author's Contributions

Jeroen van Dillen: MD, resident specialist-in-training, Former MD Onandjokwe Lutheran Hospital, Namibia. Initiated Onandjokwe maternal mortality audit and analysis of Namibian data. Drafted/ revised manuscript for Journal of World Health and Population.

Jelle Stekelenburg: MD, PhD, resident specialist-in-training, Former DMO Kalabo District Hospital, Zambia. Initiated Kalabo maternal mortality audit and analysis of Zambian data. Drafted first version of manuscript.

Joke Schutte: MD, resident specialist-in-training, Analysis of maternal deaths from the Netherlands, member of the Netherlands Maternal Mortality Committee, assisted in drafting manuscript.

Gijs Walraven: MD, MPH, PhD, public health physician/epidemiologist, Former Head Reproductive Health Programme, Medical Research Council Laboratories, The Gambia. Initiated Farafenni maternal mortality audit and analysis of The Gambia data. Revised manuscript critically for substantial intellectual content.

Jos van Roosmalen: MD, PhD, consultant obstetrician, Chairperson of The Netherlands Maternal Mortality Committee, supervised audit of maternal deaths in the Netherlands, assisted in analyzing data from the Netherlands and revising the manuscript critically for substantial intellectual content.

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Reasons for Not Reporting Deaths: A Qualitative Study in Rural Vietnam

Tran Quang Huy, Vietnam-Sweden Uong Bi General Hospital, Uong Bi, Vietnam

Annika Johansson, Department of International Health (IHCAR), Karolinska Institutet, Stockholm, Sweden

Nguyen Hoang Long, Department of Planning and Finance, Ministry of Health, Hanoi, Vietnam

Correspondence: Tran Quang Huy, c/o Annika Johansson, Department of International Health (IHCAR), Karolinska Institutet, S-17177 Stockholm, Sweden. Tel: + 46 8 51776495, Fax: + 46 831 1590, Email: Annika.Johansson@phs.ki.se

Abstract

This qualitative study explores socio-cultural and health systems factors that may impact on death reporting by lay people to registry systems at the commune level. Information on local perceptions of death and factors influencing death reporting were gathered through nine focus group discussions with people of different religions and ethnic affiliations in a rural district of northern Vietnam. Participants classified deaths as "elderly deaths," "young deaths," and "child deaths." Child deaths, including newborn deaths, used to be considered punishment for sins committed by ancestors, but this is no longer the case. Concepts of the human soul and afterlife differ between the Catholic and Buddhist groups, influencing funeral rituals and reporting, especially of infant deaths. Participants regarded elderly deaths as "natural" and "deserved," while young deaths were seen as either "good deaths" or "bad deaths." "Bad deaths" were defined as deaths of "dishonourable" persons who had led a "bad life" involving activities such as gambling, drinking or stealing. The causes of "bad deaths" and deaths due to stigmatized diseases (e.g., HIV/AIDS, tuberculosis and leprosy) were often concealed by the family. The study suggests that the risk of under-reporting deaths seems to be largest for deaths

of infants and "bad deaths." Little awareness of regulations and lack of incentives for reporting or lack of sanctions for not reporting deaths also result in under-reporting of deaths. Therefore, education programs and enforcement of legal regulations on death notification should be emphasized. The risk of misreporting the real causes of "bad deaths" and deaths due to stigmatized diseases should be considered in verbal autopsy interviews. Using different sources of information (triangulation) is useful in order to minimize both under-registration and misreporting causes of death.

Background and Rationale

Mortality rate is an important aggregate indicator for the health status of a population. Valid mortality data are obtained only when deaths are reported and registered properly. However, it is estimated that about two thirds of the world's population, mostly in low-income countries, remain outside any kind of systematic health surveillance (Beaglehole and Bonita 2001) and a significant proportion of global deaths pass unrecorded (Byass 2001). Therefore, data used to estimate mortality in many countries are questionable (Lumbiganon et al. 1990; Becker et al. 1996; Cleland 1996). Vietnam is no exception in this respect, even though it has a relatively good healthcare system (Phuong 2000; Hoanh 2000).

At the commune level in Vietnam, two main systems are responsible for recording demographic data including deaths, namely, the legal system, called the Juridical system (Household Registration System in the past) and the Communal Population Register System (CPRS). In addition, commune health centres also collect and register births and deaths in the community, especially those occurring at the centres. Despite the existence of these registration systems, the limited quality of the data has complicated efforts to present reliable estimates of mortality levels in Vietnam (Merli 1998). A recent study (Huy et al. 2003) in a rural district of Vietnam showed that at least 19% of all deaths were not registered by the CPRS; most of these were deaths of infants and elderly women.

Different factors may contribute to this situation. As in any other registry system, in the death registration system there are two equally important actors: the informers (community people) and the registrars (persons in charge within the system). The quality of data depends on both. Various factors can be assumed to interfere with the quality of reporting, such as cultural values and perceptions associated with different categories of deaths, the social status of the deceased and the perceived benefits and disadvantages of reporting a death.

The aim of the present study was to explore socio-cultural and health systems factors that may influence the completeness and quality of death reporting at the community level. Findings will help us improve the routine death reporting system as well as design community-based mortality surveys.

One important cultural concept orienting this study is that of the human soul as expressed in local culture, because we assume that this may influence perceptions and, thus, the reporting of deaths. Other concepts relevant to the analysis are stigma and shame, known in the literature to be strongly associated with various kinds of diseases, categories of death and death reporting (Long 2000; Johansson 2000).

The Concept of the Human Soul in Vietnamese Culture

In Vietnam, Confucianism, Buddhism and Taoism, known as the "triple religions" (*tam giao*), have coexisted for many centuries and have pervaded the culture and all aspects of Vietnamese life. Over time, these religions have blended and constitute what can be labelled a Vietnamese "folk religion," with Buddhism as the core (Jamieson 1993). Other religions, including Christianity (Catholicism and Protestantism), Islam, Cao Dai and Hoa Hao, coexist with the triple religions, but of these only Catholicism is practised in northern Vietnam to any sizeable degree. In Vietnamese culture the concepts of soul and spirit are fundamental to everyday religious practice (Chanh 1993; Rydström 1998). People believe that their ancestors' souls powerfully protect their offspring. Through ancestral worship the links between the realms of the living and the dead are maintained, and descendents receive protection from ancestors. Births are not merely part of biological reproduction but are seen as direct reproductions of the souls and bodies of the ancestors. "Life and death are thus conceived to

be a dialectical process that links two realms together into one biological and spiritual world" (Chanh 1993). Death is considered a passage from the natural to the supernatural realm, expressed in the Vietnamese saying "Life is a temporary stay; death is a return" (*song gui, thac ve*). Death ends the transience of one's biological life and makes possible the return to the spiritual realm of one's ancestors.

There are numerous rituals at the time of death and afterwards. It is thought that if these rituals are not carefully performed, the soul of the dead person will become a "wandering soul" and will harm his or her own offspring instead of protecting them (Chanh 1993). Rituals at birth are equally important and are held at different times within the first year after birth. Among Buddhists, the most important one is the "Rite of One Full Year of Age" (*le day tuoi*). This rite is held to express thanks to the family's ancestors and also to mark the child's "personhood" (Chanh 1993). Only after the performance of this rite is the child regarded as a "human being."

Birth and death rituals and numerous other religious ceremonies and rituals have been profoundly influenced by the socio-economic and political changes occurring over the last 50 years in Vietnam. Socialist ideology and modernization have acted to reduce the strength of religious practices and rituals (Kingsley 1996). Today's modern Vietnamese are taught to acknowledge their own influence on their daily lives and to not see their failures or successes as the consequences of otherworldly powers. Therefore, some rituals, which were regarded as Confucian, feudal and "backward," have disappeared (Rydström 1998). Moreover, in wartime, when economic resources were stunted, many rituals were set aside spontaneously. In recent decades a return to traditional rituals has been noted. For example, the ancestor cult is sustained and generally accepted in Vietnamese society today. Some funeral rituals have disappeared while others still remain, with modifications (Kingsley 1996; Rydström 1998).

Method

The study was carried out in Ba Vi district, Ha Tay province, in northern Vietnam. Ba Vi's population is around 250,000 people, belonging mainly to the Kinh (91%) and other minority ethnic groups such as the Muong, Dao, Tay, Hoa and Khme. Geographically, the district is divided into lowland, highland and mountainous areas, with 32 communes, each with 6,000 to 10,000 inhabitants. Each commune is divided into a number of hamlets. Most people in Ba Vi are farmers (81%), with agricultural production and livestock breeding as the main economic activities (Chuc and Diwan 2003).

We were aware that exploring perceptions of death and how these might influence death reporting could be sensitive and complex issues, and they were little known to us. We therefore adopted a qualitative approach using focus group discussions (FGDs), which are considered appropriate for identifying and exploring values, perceptions and attitudes of people, especially related to topics of which pre-understanding is limited (Morgan 1997). FGDs reflect and elucidate the personal experiences and opinions of those participating, as well as the perceptions in the community that they represent (Krueger 1988; Long 2000).

In this study, we conducted nine FGDs with local people from nine hamlets located in different parts of the district. These hamlets were purposively selected in terms of geographic location, religion and ethnicity, including five groups in lowland areas and four groups in highland areas. Most FGD participants belonged to the Kinh majority ethnic group, except one group in the mountainous area, which was composed of the Muong ethnic group. In six FGDs, participants were predominantly Buddhists, and two groups' participants were Catholics. The Muong minority group in the mountainous areas adheres to Vietnamese folk religion. Each discussion group consisted of 6 to 11 participants, male and female, who were all farmers having lived in the selected hamlets for at least five years. The discussions, held in Vietnamese, took place in common public settings such as the village common house. They were conducted by a moderator (the first author) and lasted for about 1½ to 2 hours. Prior to the FGDs, the research team developed a discussion guide that included perceptions about different kinds of deaths, descriptions of related rituals, and reasons for possible under-reporting and/or hiding the real causes of death. The moderator encouraged participants to

freely exchange views on these issues while keeping the basic focus of the discussion. He probed into new and interesting leads coming up and verified that he had correctly understood what emerged from the discussions.

All group discussions were tape-recorded and transcribed by the moderator and note taker immediately afterwards. Transcriptions were translated into English by a professional translator. In order to check the quality of translations, two transcripts were translated into English by two independent translators. No major differences between the translations were identified. Qualitative content analysis was used to analyze data (Morse and Field 1984; Graneheim and Lundman 2004). Analysis started when all data had been collected. Individual research team members carefully read all translated transcripts to acquire an overall sense and understanding of the whole text. Open codes were applied by two of the researchers independently and similar codes were grouped into categories and subcategories. These were compared, modified and expanded by the researchers during the analysis. Two main categories were defined: (1) types of death and related rituals with the subcategories according to age and perceived causes and (2) reasons for under-reporting and misreporting deaths. An attempt was made to identify emerging themes and discuss their underlying meaning in a socio-cultural and health systems context (Berg 2001).

The study was conducted within the FilaBavi, with ethical approval by the Research Ethics Committee at Umeå University. Permission to conduct the study was also obtained from the district authorities. Informed consent was sought from participants prior to each discussion.

Findings

Participants in Buddhist groups described life as a circular movement starting from birth, through aging and illness, and ending with death (*sinh, lao, benh, tu*). In all groups, the human soul was thought to continue its existence after biological death, either in the paradise of the Catholics, the heaven of the Divine Buddha or, for a "bad" person, in hell.

Types of Deaths and Related Rituals

All groups differentiated between three categories of deaths: elderly deaths (*chet gia*), young deaths, (*chet tre*) and child deaths (*chet tre em*). Perceptions of elderly deaths were similar between religious and ethnic groups. The death of an old person was seen as a natural process as described here:

> The death of an elder is like an old tree, which cannot produce glue to maintain its life. When a person gets old, all organs in the body – heart, lung, digestive tract – become exhausted, deteriorated. The organs cannot work any more, and the person dies.

The funeral ceremonies for deaths of elderly persons, called *mo hoi*, were described by participants as lengthy and with many formal rituals. The children of the deceased should arrange a farewell party to celebrate his or her parent's entry into "the other world." The *mo hoi* was held with a music performance and a meal offered to all attending the funeral. Usually, many people came to say farewell and to present sacred offerings to the deceased. Among the Buddhists, the funeral for an elderly person used to be held with a drama performance in which people rowed a boat to symbolize the journey of the deceased to the other world.

Participants defined "young death" (*chet tre*) as deaths of working-age adults. Such deaths were said to be caused by severe diseases, by not getting appropriate healthcare in time, by leading a "bad life," or by suicide or accident. Young deaths were divided into "good death" (*chet vinh*) and "bad death" (*chet nhuc*). Good death or "honourable death" was associated with sadness and grief for the relatives and the community. Bad death was the death of a "dishonourable" person who had led a "bad life" involving activities such as gambling, drinking, fighting, stealing or causing trouble for others. Such deaths usually left a bad reputation and shame for the relatives. The funeral ceremony for young deaths, called *lam ma*, was said to be arranged in a much simpler way than the *mo hoi* ceremony for elderly deaths. There was neither a music performance not a reading of prayers at the

lam ma ceremony, and it never lasted long since people did not want to prolong the misery of a "good death" or the shamefulness of a "bad death" for the family.

In group discussions the notion of "child deaths" (*chet tre em*) varied from the death of an infant to the death of a child up to school-leaving age. Such deaths were always considered a great tragedy. Participants often attributed causes of infant deaths to mothers' carelessness or to the exposure of the parents to toxic substances such as pesticides or herbicides, including Agent Orange, the dioxin-containing chemical sprayed during the war. Participants in all groups explained that there are many old proverbs and sayings reflecting the traditional belief that an infant death is a punishment for ancestral sins, for example, "Doi cha an man, doi con khat nuoc" (when the father eats too salty food, his children will be thirsty). Some participants, particularly older men, were also eager to point out that today a newborn death is not considered a punishment, but the sayings remain in the common language:

> In the past, people said that a child died because its parents or grandparents had committed some bad deed. Nowadays people do not think so any longer, but they still keep that in mind, reminding them not to behave badly towards others. Our older generations used this saying to educate themselves and their children.

A major difference emerging between the groups was in the definition of personhood, that is, when a child became a "full human being." The Buddhists considered a newborn as "not grown enough to be a person" and consequently did not arrange funeral ceremonies for a newborn death. The burial was carried out immediately, even at night, with only family members attending. The simple way Buddhists arrange burial for newborn deaths was remarked on in the Catholic group:

> In Buddhism, if a newborn dies, they just wrap the dead child with a mat for burial. However, we Christians should always have a wooden coffin for the deceased regardless of whether it is only five or six months or a newborn. We think that even though it is still small it is a human being, so we should do every thing the same as for adults.

Among the Catholics, if an infant or a child died, the funeral would be held with the same rituals as for an elderly or adult death, except for the prayers, as the infant is thought to become a saint immediately and prayers are not needed.

Views differed on how long an infant or child remained too young to be considered "fully human." Among the Kinh people in the lowlands, the first year of life was considered infancy, while among the Muong ethnic minority, people considered a child up to the age of 12 years an infant, (*so sinh*, meaning newly born, fragile). Only after that age would the child not be able to reincarnate: "After the age of twelve the child will not reincarnate because it has finished the period of 'God's care' – *het cua mu*" (meaning that before age 12 the child still belongs to God).

Reasons for Under-reporting or Misreporting Causes of Death

Most participants agreed that it was very difficult to hide deaths in their setting, where relationships were very close between community members. However, it was also said that certain deaths might not be reported due to a combination of factors.

Participants in Buddhist and minority groups stated that newborn deaths were often not reported and registered because the child was seen as "not grown enough to be a person" and had no relationships with other people in the community. The newborn death was seen as a great sadness for the family, and they did not want to talk about it. Therefore, even people living in the same village might not know about a newborn death. In contrast, Catholic participants agreed that all deaths were known by people in the village because when any death occurred, including a newborn one, the church bell rang to inform people of the sad news.

It emerged in discussions that adult deaths that might not be reported were those seen as "bad

deaths," such as deaths due to HIV/AIDS or suicide. Generally, the family would not want to inform others of a death that might leave a bad reputation or bring shame on the family. In deaths due to so-called social diseases such as tuberculosis and leprosy, there was a tendency to hide the cause of death because of the fear of stigma for family members, especially for younger generations. Such deaths would be reported but given different causes:

> If someone asks the cause of death, they will say that the person died of some illness. They hide some social diseases such as tuberculosis or leprosy because they think that these diseases are hereditary so their children will have inherited these diseases and then people will not maintain relationships with them.

Another factor impinging on death reporting was local birth registration practices. All groups stated that in rural areas births were often not registered for several years, even delayed until the child started schooling, as some participants in the minority group mentioned. In such a case, if a child dies, its death would not be reported either: "No birth registration, no need for death registration.… If a child dies and it has not been registered in the household registration book then there is no need to register its death."

Lack of knowledge of the duty to report deaths was also a cause of under-registration. Several participants in different groups stated that they did not know of the legal regulation to report deaths to the local authority, or they did not know where and to whom they should report the death. Others said that they knew a death should be reported, but because the families were too busy with the funeral, they paid no attention to reporting it and no one reminded them or requested them to do so. Therefore, families reported only specific deaths to get a death certificate in order to receive a death benefit, or for insurance claims or other bureaucratic transactions that need a death certificate. A number of participants mentioned that some people were not willing to report deaths because they feared that their cultivated land would be reduced, while several others knew that this regulation had been changed with the new land law promulgated in 1993. Some participants added that the termination of pension payments for retired government employees was also a reason why people might delay or neglect to report deaths.

The most common statement in all FGDs was that people did not report deaths because there was no legal sanction for not reporting, and they received no benefit from it. A male participant stated in a loud voice:

> No one is punished [for] not reporting the new birth. It is the same with death reporting. If we go for death registration, we will lose some time from our farming work. To speak frankly, people here do not report deaths because they get no benefits from that.... Why should we report death if we only lose time?"

It was also said that deaths of people not registered as residents in the community (e.g., migrants) were commonly under-reported. At the death of a community resident, local authorities normally presented flowers and sacred offerings to the family. This was not the case for non-residents. One participant told the group, "My sister came here to work on a short-term contract for a State Farm. We got nothing for her death; therefore we did not report it."

Discussion

In this study from a rural area in Vietnam, we have explored socio-cultural and health systems factors that may impinge on the quality and completeness of death reporting by lay people to registry systems at the commune level. Generally, perceptions of death and rituals at death described by participants in our study are similar to those reported in previous studies from Vietnam (Chanh 1993; Rydström 1998; Minh 2002) and can also be found in other cultures (Castle 1994; Jewkes and Wood 1998; Marrone 1999; Einarsdotter 2000; Yang and Chen 2002). However, few of these studies

have explored the effects of death-related perceptions and classifications on death reporting.

Our study has demonstrated how perceptions of the human soul and personhood seem to have an important bearing on how infant deaths are reported or not reported, particularly among Buddhist groups. The considerable under-reporting of infant deaths found in the commune registry system (Huy et al. 2003) is given many supporting explanations in our study. Even though many participants pointed out that they did not consider an infant death as punishment for ancestral sins, as was common in the past, such beliefs may still influence how people perceive and deal with an infant death. The burial for a newborn death was described as being so fast and secret that many people in the same village did not know about the death. In this case, the death may obviously be easily missed by the person in charge of the death registry. Buddhist participants regarded a newborn as "not grown enough to be a person." Chanh (1993) also noted this perception. He described that the child less than one year old was not considered old enough to possess an authentic human soul (*linh hon*). Therefore, if the child dies before the age of one, it will become not a human soul, but a "little demon" (*ranh*) that is believed to have the capacity to reincarnate itself (Chanh 1993).

In findings similar to ours, Jewkes and Wood (1998) noted in their study conducted in rural South Africa that infant deaths were not ritually mourned by the family and the community because the child was considered "not yet a human being" or "an angel taken by God." The burial for a very young infant death was described as "urgent" and "rapid." The view of infants as "not yet fully human" together with little awareness of why registration was necessary had contributed to the low rate of death registration in the South African study (Jewkes and Wood 1998). At the core of this practice in both settings lies the cultural construction of personhood as a process rather than as a stage achieved through a live birth, as is implied in discourses of the vital registration system. We suggest that the discrepancy between local definitions of personhood and those implied in vital registration systems helps explain the under-reporting of both births and deaths found in many countries.

Further, it emerged in our findings that certain causes of death, notably HIV/AIDS, leprosy, tuberculosis and suicides, were closely associated with concepts of stigma and shame for the deceased's family. This was seen as having a potentially large impact on misreporting causes of death, although hiding such deaths was thought to be difficult. Misreporting of the real causes of death that are stigmatizing and considered shameful has been demonstrated in several other studies in Vietnam and other low-income countries (Hieu et al. 1999; Bramley 2001; Songane and Bergström 2002). For example, studies of tuberculosis in Vietnam (Long 2000; Johansson 2000) have shown how people hide the real causes of the disease for fear of being stigmatized. Today HIV/AIDS seems the most severely stigmatizing disease, not only for the sick person but for the whole family (Ngamvithayapong-Yanai et al. 2005; Varas-Diaz et al. 2005). In our study, a death due to HIV/AIDS was seen as a bad death caused by a bad lifestyle, which is in line with public opinion in Vietnam, which classifies HIV/AIDS as one of the "social evils" (Mensch et al. 2003).

Among the three types of death defined by our FGD participants, elderly deaths were described as "natural" and "deserved" and the funeral as a ceremony of remembrance and wishing the deceased a safe journey to the other world. However, reporting of such deaths may be easily neglected. From a social point of view, elderly farmers in Vietnam have little material relationship with society. They are exempted from social contributions (men and women under 60 and 55 respectively have to contribute 15 days of work annually) and they do not receive a pension from the State. Therefore, administratively, it is not necessary to report or register their deaths. The lower reporting of female deaths found in our previous study (Huy et al. 2003) as compared to male deaths could be partly explained by the fact that women generally live longer and more often live alone. Thus, as noted also by Merli (1998), there may be no one around to report their deaths.

Health systems factors that contribute to possible under-reporting of deaths are the absence of both benefits for reporting and legal sanctions for not reporting a death. In our study, several participants did not know of the legal regulations to report deaths, while others knew but did not practice it because "no one reminds [them] or requests it." The same situation has been described in a study from rural Thailand (Lumbiganon et al. 1990), where 45 % of infant deaths were not

reported. Mothers of children who had died explained that as they had not registered the birth of the child, they saw no need to register the death, and there were neither sanctions nor benefits linked to the registration. This may be even more common in Vietnam, where it is not compulsory to have a death certificate to bury a dead person.

Demographic information, including data about deaths, collected by the routine registry systems are necessary for planning purposes, provided they are complete and of high quality. Information collected at the commune level is obviously important because misconceptions at this level will create inaccuracies throughout the system. However, various studies have pointed out severe under-registration and misrepresentation in the current system in Vietnam. For instance, a study conducted in three provinces in Vietnam by Hieu (1999) added 16% of deaths after extensive research from different registry systems. A relatively large discrepancy of maternal deaths between the healthcare system and the population system, as well as numerous misreported maternal deaths, was also found in the study by Bramley (2001). The findings of this study therefore have practical implications that should be disseminated to people working for the registry systems as well as to the communities. All stakeholders must be made aware of factors that could obstruct the process of reporting death and consequently impinge on the quality of data collected by existing systems. Local leaders such as village heads and registrars dealing with death registration at the grassroots level should work in a more *active* manner and be aware of the *passive* attitude and ignorance in the community with respect to death registration. They must *request* and *remind* community members to report deaths in an appropriate time interval. In addition, and in order to increase the active involvement of people, it is important to introduce education programs to make people understand the importance of death surveillance and their legal obligation to report deaths, as well as other lawful documents such as the new land law passed in 1993 that provides for the inheritance of allocated land. Moreover, law enforcement in parallel with motivation should be considered as a way of increasing people's active participation in registering deaths.

There are certain limitations in our study. First, FGD participants were not homogeneous in terms of sex and age. Therefore, following traditional Vietnamese hierarchical structures, in some groups male and/or older participants talked more than the others, and younger participants tended to repeat the views of older ones. In other groups, it was difficult to get a good discussion going as some participants were rather passive and responded to the moderator's questions but did not continue the discussion among themselves. This could be because they were not familiar with such group discussions and felt shy. We acknowledge that this could have impinged somewhat on the richness and diversity of the findings, which may have been enhanced with more homogeneous groups. For example, a group with only women might have yielded more in-depth understanding of how infant deaths are perceived and dealt with. Second, we are aware that translating the FGD transcriptions from Vietnamese into English is a delicate task. We took measures to double-check the appropriateness of the translation, but nuances could have been lost. This may apply especially to concepts of personhood and the human soul. With these limitations in mind, we consider our findings trustworthy and relevant, enabling a deeper understanding of the causes of under-reporting deaths.

Conclusions

Our study indicates that under-reporting of deaths is likely to occur in the study setting, especially infant deaths, deaths due to tuberculosis, leprosy, HIV/AIDS, and other "social diseases," and deaths among migrants who are not registered as residents in the community. Reasons for not reporting deaths include perceptions that newborns and infants are not considered "fully human," fear of social isolation and stigma of family members and low enforcement of death-reporting regulations. These factors should be taken into account by those in charge of death registration in order to minimize under-registration of deaths. Under-reporting of infant deaths represents a big challenge for the collection of trustworthy indicators of infant mortality in Vietnam from routine reporting systems and from surveys. Both the cultural context and influence of policy on infant death registration need to be considered. That stigma and shame seem to be strongly associated with certain causes of

death provides a warning signal for researchers using the verbal autopsy technique as a method of identifying causes of deaths. Using different sources of information (triangulation) is useful in order to minimize both under-registration and misreporting.

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Household Decisions to Utilize Maternal Healthcare in Rural and Urban India

Sisira Sarma, PhD (Corresponding author)
Post Doctoral Fellow, Microsimulation Modelling and Data Analysis Division
Applied Research and Analysis Directorate, Health Policy Branch, Health Canada
Ottawa, Ontario, K1A 0K9 E-mail: sisira_sarma@hc-sc.gc.ca

Henry Rempel, PhD
Senior Scholar, Department of Economics, University of Manitoba
Winnipeg, Canada, R3T 2N2 E-mail: hrempel@cc.umanitoba.ca

Abstract
With the onset of pregnancy, a household must add the health of the expectant mother and the unborn child to its overall objective. Data from the Government of India's National Sample Survey Organization is utilized to analyze the determinants of women's decisions to register for pre- and postnatal healthcare, utilize maternal healthcare and select a place for childbirth. The data show that the level of schooling mothers have attained has a significant, positive effect on decisions to register and utilize these healthcare services in both rural and urban areas. In contrast, distance to a maternal health facility centre inhibits decisions to register for and utilize these services in rural India. In addition, awareness of healthy behaviour and factors that affect such knowledge at the household and community level are key determinants of whether maternal–child healthcare services are used. The findings demonstrate that the health status of women and children in India can be improved significantly by strengthening IEC (Information, Education and Communication) efforts on the demand side and reducing access barriers on the supply side.

1. Introduction

The United Nations' Millennium Development Goals, set to reduce poverty by 2015, place a strong emphasis on child and maternal health. Of the eight goals, one is to reduce the child mortality rate by two thirds and another is to improve maternal health. The combination of these two is an important input to a third goal: promote gender equality and empower women.

India is at the forefront of a struggle to achieve these Millennium Development Goals. While the child (under five) mortality rate has declined from 202 (per 1,000 live births) in 1970 to 93 in 2001, this is still above the average for all developing countries (United Nations Development Programme [UNDP] 2003: Table 8). Abusaleh Shariff and Geeta Singh (2000) report more than half the children have a low birth weight and a low probability of survival. The incidence of child stunting is reported as 46% (UNDP 2003: Table 7). Stunting is defined largely by malnutrition and secondarily by illness, and it often begins in the womb.

Maternal mortality in India is about 400 maternal deaths per 100,000 live births. Lack of access to and use of appropriate maternal healthcare services during pregnancy and childbirth are responsible for most of the deaths. Utilization of maternal healthcare services is often hindered by lack of literacy combined with limited access. Furthermore, many women in rural areas receive little additional nutrition during pregnancy. One World Bank report suggests that iron-deficiency anemia is widespread among Indian women and affects 50% to 90% of pregnant women adversely. In order to address the health status of women, the government of India initiated several programs in the 1990s (such as the Family Welfare Program, Child Survival and Safe Motherhood Program, Integrated Rural Development Program, etc.). Most of these programs were designed to improve the health status of women and children and reduce maternal and child mortality. Among other things, the safe motherhood component of the program emphasizes expansion of maternal healthcare facilities covering rural and remote areas for providing obstetric care.

An important means to reduce child mortality and improve health for mother and children is access to and use of appropriate pre- and postnatal care. The purpose of this paper is to analyze household decisions that determine utilization of pre- and postnatal care, including place of child delivery. Understanding the underlying decision processes of these three dominant forms of care is essential to designing effective health policy in developing countries. The basis for this analysis is data from the government of India's National Sample Survey Organisation.

After a brief overview of relevant literature, we summarize the information provided in the National Sample Survey on the number of pregnant women registered for pre- and postnatal care, the selected place for childbirth, and utilization of selected prenatal care services. A logit model is then employed to analyze the determinants of registration for pre- and postnatal care, utilization of maternal healthcare and choice of location for childbirth. In order to understand the determinants of the extent of utilization, a negative binomial regression model is employed to model the number of visits to pre- and postnatal health clinics.

The National Sample Survey has an urban and a rural component. This enables analysis of determining factors in rural and urban areas, plus some comparison of the results obtained from the two surveys. Specifically, comparing urban and rural results will shed some light on the peculiar rural–urban differences such as the provision of health services, perceived need and use among pregnant women, health-seeking behaviour, barriers to access, economic status, and the status or position of women in society that shapes decisions to register for pre- and postnatal healthcare.

2. The Maternal and Child Health Production Processes

With the onset of pregnancy, a household's utility function will be expanded to include the health of the expectant mother and the unborn child. Given a family's budget constraint, its knowledge of a health production function and all aspects of its ability to act on this knowledge, the household will strive to meet these new elements in its utility function. These efforts will be shaped as well by the maternal and child health production processes available to households.

Utilization of Maternal and Child Health Production Processes

Registering for pre- and postnatal care is a first step in decisions to utilize these services. A household decision to register for available maternal–child health production processes is a function of (1) household awareness of these processes, (2) household access to the processes and (3) the expectant mother's ability to act on her knowledge of accessible production processes.

Awareness at the household level is primarily the product of generations of accumulated wisdom and experience. This knowledge will be modified as a product of educating household members, especially the expectant mother, and of healthcare facilities being established in proximity to the household (Barrera 1990; Strauss and Thomas 1995). Current experience also modifies traditional knowledge. For example, previous pregnancies affect the timing of when women first seek some form of prenatal care. Difficulties in previous pregnancies are more likely to cause women to seek assistance relatively early in the pregnancy (Enderlein et al. 1994; Matthews et al. 2001).

Awareness of health production processes is hard to measure. A study carried out more than 20 years ago reported that only 11% of the women sampled were aware of maternal–child health programs (Smucker et al. 1980). To update this analysis, we utilize data on whether or not expectant mothers and new mothers have registered within the healthcare system as an indicator of awareness of pre- and postnatal healthcare.

Given a household's awareness level, there is then the question of access. Poverty may well limit access to adequate nutrition, potable water, sanitation facilities and sanitary practices. Further, limited household income can constrain access to better quality private healthcare (Matthews et al. 2001). Access also is defined by distance to available health services (e.g., an *Anganwadi* Child Care Centre), including convenience for women to travel that distance (Barrera 1990; Govindasamy 2000; Shariff and Singh 2000).

Given awareness and accessibility, the mother still makes decisions on whether or not to act on what she knows and what is accessible. Mothers, as primary healthcare providers within a household, may make allocation decisions that place the well-being of husbands and existing children above that of her own health and the health of children as yet unborn (Govindasamy 2000).

The literature indicates that several factors are significant in shaping such healthcare utilization decisions. The first is education levels within the household, including schooling completed by the mother. We have noted that education expands knowledge and reduces the cost of obtaining information. It also serves to indicate a willingness to invest in human capital, which would include better nutrition and household practices intended to affect the health of the child (Barrera 1990; Shariff and Singh 2000). Education also affects household preferences, given prices, income and knowledge (Barrera 1990; Govindasamy 2000; Smucker et al. 1980). Finally, education can affect efficiency by increasing the productivity of health inputs received and purchased (Barrera 1990). One example is the effect of education on fertility reduction, and hence the spacing of children (Vlassoff 1991). Also, education correlates negatively with breastfeeding, but the effect of education on other postnatal health processes more than offsets the negative effect of reduced breastfeeding (Strauss and Thomas 1995).

A second factor that affects maternal–child health utilization decisions in India is economic status and freedom of movement for women. Women with greater freedom obtain higher levels of prenatal care and are more likely to opt for safe delivery care. Bloom et al. (2001) conclude this effect of freedom of movement on utilizing maternal–child healthcare is comparable to that of 12 years of schooling.

One indicator of freedom of movement is a woman employed outside the home. The evidence here is mixed. Shariff and Singh (2000) note women employed for wages face fewer movement restrictions. They conclude, though, that this primarily affects the choice of child delivery services. In contrast, women employed outside the home are less likely to opt for a trained birth attendant (Bloom et al. 2001). It appears that an important variable is whether the employment involves cash remuneration. If so, it increases the opportunity cost of taking time off to seek prenatal care, but it increases a household's ability to pay for health services, including a trained birth attendant (Shariff and Singh 2000). In Egypt, Govindasamy (2000) reports that women who were in the labor market, but not for cash income, were less likely to receive tetanus toxoid. Working for cash, at least when employed by the government, includes some maternity care services, and this affects health utilization decisions (Govindasamy 2000).

Two factors that have significant negative effects on the utilization of maternal–child healthcare are age of the mother and parity (i.e., the number of children a woman has). These two variables have a high, direct correlation, so studies tend to enter one or the other but not both (e.g., Bloom et al. 2001). Govindasamy (2000) reports a significant negative correlation between age/parity and utilizing prenatal care in general and receiving tetanus toxoid specifically. Shariff and Singh (2000) conclude that it is not possible to sort out whether this negative correlation means parents have more experience and hence require less external healthcare assistance, or whether a lower birth order signifies a feeling of "unwantedness" for the expected child.

Maternal and Child Health Production Processes

An ability to affect maternal–child health depends on the elements of health production available to households in a community. Primary elements of this production function include a clean environment, quality of water, sanitation practices and facilities, adequate nutrition and availability of healthcare facilities.

Water and sanitation tend to have a powerful impact on maternal and child health (Barrera 1990; Strauss and Thomas 1995). This is likely a factor in why infant mortality and child mortality and morbidity are typically lower in urban than in rural areas in countries such as India. Even so, environmental factors can significantly aggravate the situation. For example, the presence of tetanus spores within a household rises significantly if the household has large animals (Smucker et al. 1980).

The provision of adequate nutrition is the part of the health production function most directly within the household's control. This starts with the health of the mother and continues through breastfeeding and introducing supplementary nutrients for the young child. Poverty may well affect this process in several ways. There may not be an adequate supply of food or the range of nutrients available may be inadequate for maternal and child health. In addition, the quality and safety of the food is affected by the water and sanitation facilities and practices. Where inadequate, adverse effects such as diarrhea can rob mother and child of necessary strength and health.

Availability of healthcare facilities and programs can contribute significantly to the overall health and survival rates of children. Basic elements of such healthcare include the following:

- prenatal examinations for the mother to determine her nutritional and overall health status (e.g., weight recorded, blood pressure recorded, hemoglobin estimated and urine checked);
- advice on proper nutrition and sanitation;
- access to basic nutrient supplements as required (e.g., distribution of iron and folic acid supplements);
- identification of risk factors that might require specialized treatment and care, especially during child delivery;
- provision of immunization (e.g., tetanus toxoid for the mother and measles vaccine for the child);
- advice and guidance on breastfeeding;
- the timing and nature of food supplements for a young child;
- treatment for diarrhea and acute respiratory infections; and
- advice on fertility control and provision of related services to reduce the number of pregnancies and increase the time interval between pregnancies.

India has attempted to establish a universal public healthcare delivery system. Given severe resource constraints, the most notable achievements are in the areas of increased immunization and reduced fertility (Berman 1998). The most effective healthcare facilities in delivering prenatal care are the village-level *Anganwadi* Child Care Centres instituted as part of the Integrated Child

Development Program, popularly known as IRDP (Shariff and Singh 2000). While trained and untrained *dais* (i.e., traditional birth attendants or midwives) are primary caregivers for child delivery services, they play a limited role in providing prenatal care (Matthews et al. 2001). They admit having little to offer in the way of treatment and have no medicines to administer, so women seek such assistance elsewhere (Shariff and Singh 2000).

India has instituted a system of prenatal cards that are kept by the women. This form of record keeping, transferable among various providers of maternal and child health services, can facilitate a more comprehensive delivery of relevant services by the healthcare system. Adding notes of advice given and actions taken by private practitioners to these records would make them more complete and hence effective (Matthews et al. 2001).

3. Data Source

The data source for the empirical exercise is the 52nd round of the National Sample Survey (NSS) data, a nationally representative recent survey conducted by the National Sample Survey Organization (NSSO), Ministry of Statistics, Government of India from July 1995 to June 1996. The survey covered utilization of maternity and child healthcare services, morbidity and utilization of medical services, and problems of aged persons. In this paper, we are analyzing household responses related to the maternal and child healthcare components. The NSS survey also contains a wealth of socioeconomic and demographic information on individual, household and community-level characteristics.

The NSSO adopted a two-stage stratified sampling design. The first stage units were census villages in rural areas and NSSO urban blocks in urban areas; the second stage units were households in both rural and urban areas.[1] The actual numbers of households surveyed on healthcare in rural and urban areas were 71,284 and 49,658, spread over a sample of 7,663 villages and 4,991 urban blocks, respectively. The survey covered the whole of India, except for some interior areas of Nagaland, Andaman and Nicobar Islands, and the Ladakh, Kargil and Dodha districts of Jammu and Kashmir.

Regarding maternal and child healthcare utilization data, the survey collected information on the details of healthcare received by children below five years of age and maternity care received by pregnant women during 365 days prior to the date of survey for each sample household. The survey asked questions about immunization of children, pregnant women and nursing mothers, registration of children and women for pediatric care, pre- and postnatal care and food supplements received and medical attention during childbirth.

The ability to analyze household decisions to utilize maternal healthcare services is limited by the cross-sectional nature of the data. The content of the National Sample Survey limits the analysis primarily to characteristics of the women involved and the households in which they reside. Through the village characteristics data, we are also able to extract information on distance to a nearest maternal health centre and bus service to the village. Given the information available, we seek to address the following issues:

1) What is the effect of mother's schooling on her decision to register for pre- and postnatal care, use maternal healthcare services and select a place for childbirth?
2) What is the impact of the characteristics of the household – number of female adults available in the household, scheduled caste and scheduled tribe (the economically and socially disadvantaged class) – on a decision to register for pre- and postnatal care, use maternal healthcare services and select a place for childbirth?
3) What is the effect of awareness at the household level on a decision to register for pre- and postnatal care, use maternal healthcare services and select a place for childbirth?
4) What is the impact of distance from maternal–child health facility and whether or not this affects a decision to register for prenatal and postnatal care, use maternal healthcare services and select a place for childbirth?

4. A Summary of Survey Data on Maternal–Child Health in India

Maternal healthcare services consist of prenatal care, medical attention during child delivery and postnatal care. High maternal mortality rates coupled with lower utilization of prenatal care, delivery at home and postnatal care, and consequent high infant mortality rates, are observed widely across socioeconomic groups and geographical regions in India, particularly in rural areas. The substantial variation in utilization of maternal services may be due to striking differences in health-seeking behaviour of people across socioeconomic groups on the demand side and access barriers on the supply side. The social, economic and cultural dimensions embedded within the Indian social system may in turn govern the health-seeking behaviour of women.

Prenatal Care

Prenatal care services are part of primary healthcare services for pregnant women and include regular medical checkups, medical advice regarding health, hygiene and nutrition related to pregnancy and child-bearing. Pregnant women who register for prenatal care and who visit on a regular basis usually receive iron and folic acid tablets and are vaccinated against tetanus.

The NSS data (see Table 1) show that only 45% of rural and 70% of urban pregnant women aged 15 to 49 were registered for prenatal care (including those registered because they were ill, and advice of ANM (Auxiliary Nurse Midwife), and others). This is a marked increase from the 11% reported by Smucker et al. (1980) some twenty years earlier. Table 2 shows the type of institutions where pregnant women registered for prenatal care. This distribution shows that health-seeking behaviour and provision of adequate prenatal care services remain critical in rural India and need the attention of public policy makers.

Table 1. Number of pregnant women registered for prenatal care in rural and urban areas by reasons for seeking care (aged 15–49 years)

Reasons for seeking care	Rural		Urban	
	Sampled	Estimated (00)	Sampled	Estimated (00)
Routine prenatal care	5,873 (28.58)	59,304 (25.19)	6,982 (57.50)	28,081 (53.15)
Felt ill	675 (3.29)	7,036 (2.99)	442 (3.64)	1,849 (3.5)
ANM/LHV advised	2,039 (9.92)	25,028 (10.63)	572 (4.71)	2,396 (4.53)
Other	420 (2.04)	3,721 (1.58)	411 (3.38)	1,711 (3.24)
Registered	**9,175 (44.65)**	**96,667 (41.06)**	**8,544 (70.37)**	**34,619 (65.52)**
Total	20,549	235,442	12,142	52,834
Non-registered	**11,374 (55.35)**	**138,775 (58.04)**	**3,598 (29.63)**	**18,215 (34.48)**

Figures in parenthesis are respective percentages. These numbers differ slightly from the NSSO Report as we do not account for missing cases.
Source: Based on NSSO (1998).

Ideally, two doses of the vaccine against tetanus are required for pregnant women. Table 3 shows that in rural areas 93% of pregnant women who had registered for prenatal care and 30% who had not registered took tetanus toxoid. The corresponding figures in urban areas were 96% and 50%

respectively. This indicates that those who register for prenatal care undoubtedly receive a much better level of services, including the tetanus toxoid vaccine.

Table 2. Number of pregnant women registered for prenatal care per 1,000 Pregnant Women in Rural and Urban Areas by Type of Institution Care

Type of Institution	Rural	Urban	All
Public hospital	293	433	341
PHC	357	68	258
Public dispensary	50	18	39
Private hospital	133	219	163
Nursing home	39	135	72
Charitable home	2	14	6
ESI doctor/AMA	3	4	3
Private doctor	113	102	110
Other	6	6	6
Total[a]	1,000	1,000	1,000

[a] Includes not-reported cases.
Source: Based on NSSO (1998).

Table 3. Distribution of pregnant women by number of doses of tetanus toxoid received in rural and urban areas

Doses	Rural		Urban	
	Registered for Prenatal Care	Not Registered for Prenatal Care	Registered for Prenatal Care	Not Registered for Prenatal Care
One dose	2,452 (27.56)	1,254 (12.47)	2,149 (25.91)	590 (19.61)
Two doses	5,850 (65.75)	1,762 (17.52)	5,782 (69.70)	925 (30.74)
Not received	596 (6.7)	7,042 (70.01)	364 (4.39)	1,494 (49.65)
Total	8,898	10,058	8,295	3,009
Total[a]	**8,951 (47.02)**	**10,087 (52.98)**	**8,324 (73.4)**	**3,017 (26.6)**

[a] Includes cases for which no tetanus information was available.
Figures in brackets are respective percentages.
The sample size differs from the NSSO (1998) because the numbers are calculated from the sample generated from the NSSO Data after missing cases are deleted.

In addition, anemia is a major health concern among pregnant women in India. To control for this, iron and folic acids (IFA) are distributed at designated prenatal care centres. Table 4 shows that in rural areas 81% of those registered for prenatal care and 13% of those not registered received some

IFA tablets. The corresponding figures in urban areas are 83% and 24% respectively.

Although some pregnant women have received IFA tablets and one or two doses of vaccine against tetanus without registering for prenatal care, continuous monitoring of the health of pregnant women and issues relating to child-bearing necessitates registration. Moreover, provision of this formal care is limited in rural areas and eligibility for food supplements during pregnancy is determined only if the woman is registered for prenatal care.

Table 4. Distribution of pregnant women by number of IFA tablets received in rural and urban areas

Number of Tablets Received	Rural		Urban	
	Registered for Prenatal Care	Not Registered for Prenatal Care	Registered for Prenatal Care	Not Registered for Prenatal Care
1–49	2,154 (24.27)	474 (4.82)	1,863 (22.52)	258 (8.82)
50–99	3,589 (40.44)	597 (6.07)	3,258 (39.38)	311 (10.63)
100 or more	1,463 (16.48)	181 (1.84)	1,721 (20.8)	147 (5.02)
Not received	1,669 (18.81)	8,581 (87.27)	1,432 (17.31)	2,210 (75.53)
Total	8,875	9,833	8,274	2,926
Total[a]	**8,951 (47.02)**	**10,087 (52.98)**	**8,324 (73.4)**	**3,017 (26.6)**

[a] Includes cases for which no IFA information was available.
Figures in brackets are respective percentages.
The sample size differs from the NSSO (1998) because the numbers are calculated from the sample generated from the NSSO Data after missing cases are deleted.

Healthcare during Child Delivery

Provision of adequate medical attention during and after delivery is important for the well-being of mother and child. Absence of such care and lack of hygienic conditions at the time of birth may lead to complications leading to increased risk of maternal or child death, or both.

Table 5 shows that 75% and 38% of childbirths are taking place at home in rural and urban areas respectively. The NSS data show that 36% of births in rural areas and 16% of births in urban areas lacked medical attention. This suggests a sizable proportion of home births do not receive adequate medical care.

Postnatal Care

Postnatal care is another important component of maternal healthcare in India. Postnatal registration is vital to receive appropriate medical advice and to regain health after the strains of child-bearing on the mother and for the well-being of the newborn baby. For instance, postnatal care includes advice on nutrition in food for the mother so as to feed her baby with her own milk, and advice on receiving free medicine, tonic, other vitamins, and food supplements, etc. Moreover, treatment of complications that might have occurred during the delivery requires attention of trained professionals.

The NSS data show that only 40% of urban mothers and 24% of rural mothers who delivered in the year prior to the survey date had registered for postnatal care. Table 6 shows the type of institutions where the mothers registered for this care.

Table 5. Distribution of mothers by place of childbirth (pregnant women during last 365 days and aged 15–49 years)

Place of Birth	Rural		Urban	
	Sampled	Estimated (00)	Sampled	Estimated (00)
Home	13,283 (75.2)	144,112 (77.87)	3,443 (32.12)	15,518 (37.76)
Medical facility	3,635 (20.58)	33,139 (11.91)	6,978 (65.1)	24,397 (59.37)
Other place	142 (0.8)	1,539 (0.83)	52 (0.5)	226 (0.55)
Total	**17,664**	**185,069**	**10,719**	**41,093**
Non-medical institution	**14,029 (79.42)**	**151,930 (88.09)**	**3,741 (34.9)**	**16,696 (40.63)**

Figures in parenthesis are respective percentages. These numbers differ slightly from the NSSO Report as we do not account for missing cases.
Source: Based on NSSO (1998).

Table 6. Number of mothers registered for postnatal care per 1,000 mothers in rural and urban areas by type of institution care

Type of Institution	Rural	Urban	All
Public hospital	325	421	360
PHC	336	65	236
Public dispensary	45	21	36
Private hospital	125	229	163
Nursing home	45	146	82
Charitable home	5	14	8
ESI doctor/AMA	8	5	7
Private doctor	86	78	83
Other	7	9	8
Total[a]	1,000	1,000	1,000

[a] Includes not-reported cases.
Source: Based on NSSO (1998

5. The Sample Size and Variable Construction

In this paper, we considered seven binary dependent variables: (a) **prenatal registration** – the decision to register (or not) for prenatal care of the sub-sample of women reported pregnant during the year preceding the survey date, (b) **prenatal use** – whether (or not) prenatal healthcare services were utilized (i.e., made at least one visit to the prenatal health centre) by the sub-sample of women, (c) **tetanus toxoid** – whether (or not) one or two doses of tetanus toxoid were received by the sub-sample, (d) **IFA tablets** – whether (or not) iron folic tablets were received by the sub-sample, (e) **childbirth** – the decision to deliver a child in a health institution (or not) of the sub-sample of

pregnant women delivered during the year preceding the survey date, (f) **postnatal registration** – the decision to register (or not) for postnatal care of the sub-sample of pregnant women delivered during the year, and (g) **postnatal use** – whether (or not) postnatal care was utilized (i.e., made at least one visit to the postnatal health centre) by the sub-sample of pregnant women delivered during the year preceding the survey date. In order to analyze the extent of utilization of pre- and postnatal care, we used the number of visits as our measure of outcome. Note that the number of visits to prenatal care centres is truncated at 11 as there are small numbers of observations beyond this limit. Similarly, the number of visits to postnatal care centres is truncated at seven.

Table 7. Summary data on pregnancies of ever-married women below 50 years of age

A LOOK AT THE RAW DATA **Particulars of pregnancy(ies) of ever married women of age below 50 years**			
	Response Items	Urban	Rural
Whether pregnant during last year	Yes	12,143 (25.22%)	20,555 (27.38%)
	No	36,000 (74.78%)	54,507 (72.62%)
Whether registered for prenatal care (if pregnant during last year)	Yes	8,544	9,176
	No	3,094	10,376
	Missing	505	1003
Place of childbirth (if delivered during last year)	Institution	6,978	3,635
	Non-institution	3,495	13,425
	Missing	246	601
Whether registered for postnatal care (if delivered during last year)	Yes	4,641	4,556
	No	5,682	12,307
	Missing	396	798
Used prenatal care	>0 visits	8,448	9,017
Used postnatal care	>0 visits	4,436	4,333

The number of ever married women aged below 50 years who were pregnant during the last 365 days preceding the date of the NSS survey who were interviewed in rural and urban areas were 20,555 and 12,143, respectively. However, after deleting non-responses and missing cases, we are left with 19,032 and 11,337 relevant observations for prenatal care in rural and urban areas, respectively.[2] For those who were pregnant and delivered, the relevant observations are appropriate for studying the factors governing childbirth and the decision to utilize postnatal care. The corresponding valid observations for these two cases are 16,592 and 10,179 in rural and urban areas, respectively.

Individual Specific Variables

The individual level variables considered in this study are mother's age and mother's education. Age is represented by a continuous variable ranging from 14 to 49. Education is included as three dummies for primary, secondary, and higher secondary and above, with no education being the reference category. This representation has a nice interpretation since each coefficient provides incremental effects of education.

Household Specific Variables

At the household level, relevant explanatory variables within the data include the number of women aged 15 and above other than mother and caste. Presence of other household members in the family, especially adult and older women, has profound implications for a number of reasons. Presence of older women in the family may not only provide maternity and child health advice from their own experiences, but also render assistance at the time of delivery and caring for the baby. So, presence of the number of women other than mother in the household is considered an important familial variable.

Certain household characteristics are associated with stylized facts that are embedded in the economic, cultural and social values within the society. Four such important factors are considered here to reflect a complicated social system that is functional and governs important family decisions including utilization of maternal healthcare.

The scheduled caste and scheduled tribe people in rural India are, generally, not integrated well into society and the economy. So one might expect a different behavioural response from these groups. A dummy variable is entered that takes a value of 1 if the household belongs to the scheduled caste or scheduled tribe category; otherwise, the value is 0.

Awareness

Awareness at the household level is an important dimension of knowledge and health-seeking behaviour of people in both rural and urban areas. Sources of knowledge could be the direct product of past accumulated knowledge at the household level or new knowledge acquired through the IEC (Information, Education and Communication) program being implemented by the Ministry of Health and Family Welfare, Government of India. We have two such important dummy variables to measure knowledge that affects the awareness dimension in this study. One dummy variable takes the value 1 if any member of the household has knowledge of immunization of pregnant woman. The other dummy variable takes the value 1 if any member of the household has knowledge of oral rehydration therapy (ORT) for severe diarrhea.

Accessibility

The NSS survey collects no information about accessibility issues. Accessibility may not be a big issue in urban areas, but lack of access to primary maternal health services in rural areas is well documented. In this study, the access variables of interest are gleaned from the sample village characteristics provided with the NSS survey data.

Distance to a nearby maternal and child healthcare centre may be an important inhibiting factor governing utilization of maternal health services. After controlling for all other factors, we would that expect the higher the distance to a maternal health centre, the lower the utilization rates. Transportation may be another major impediment affecting utilization of maternal health services in rural areas. This is because availability of public transportation is poor, and private transportation is costly and unaffordable for the vast majority. Greater distance and lack of transportation may be a huge barrier to access in rural areas. In order to examine the interaction of distance and transportation availability, we conducted statistical tests of interaction effects (interaction terms of distance variables and a dummy variable that takes a value 1 if the village is connected by a bus service [operated publicly or privately]). We expected that access to transportation in the presence of distance barriers would lessen the impact of the barriers on utilization of maternal healthcare.

6. Estimation and Discussion of the Results

For the dichotomous outcome variables, logit or probit models are appropriate. However, one advantage of using a logit model is that it can be interpreted conveniently in terms of changes in the odds of observing the outcome 1 versus 0. Thus, we use a logit model for each binary outcome variable and present the odds ratios. For the non-negative integer outcome variables (i.e., the number of visits to pre- and postnatal centres), we employed a negative binomial model. Although a Poisson regression

model can be used to model such non-negative integer outcome variables, the equidispersion property that the conditional mean is equal to the conditional variance of Poisson regression model is a very restrictive assumption. In fact, the likelihood ratio test rejects the null hypothesis of equidispersion in favour of overdispersion, suggesting that the negative binomial model is preferable. For technical discussion on these issues, see Cameron and Trivedi (1998) and Sarma and Simpson (2006).

We use the same set of exogenous covariates for all the models and apply them to both rural and urban samples in order to make an assessment of how mother's education, awareness at the household level and access factors (in rural areas) determine utilization of maternal healthcare services in rural and urban India. The NSS data enable analysis of differences among states (i.e., provinces) in the utilization of maternal health services. In order to control for potential unobserved heterogeneity, we have used a state-fixed effects model in our analysis. This is captured by entering state dummy variables with Kerala as the reference category in our model. Although not presented here, the coefficients on state dummy variables are statistically significant in most instances and the detailed results are available from the authors upon request. In the rest of this section, we discuss the key policy interventions called for, based on the empirical findings, to improve upon utilization of and access to maternal healthcare services in rural and urban India.

The odds ratios for prenatal registration, prenatal use, tetanus toxoid received and IFA tablets received in rural areas are presented in Table 8a. Corresponding results for urban areas are presented in Table 8b. Table 9a presents the odds ratios for institutional birth, postnatal registration and postnatal use in rural areas. Corresponding results for urban areas are presented in Table 9b. Columns 1 and 3 of Table 10 present the negative binomial regression results for the number of visits to pre- and postnatal health facilities in rural areas. The corresponding results for urban areas are presented in columns 2 and 4 of Table 10.

Individual Factors Shaping Decisions

The effect of education on decisions to register and utilize prenatal care increases with higher levels of schooling attained. This result holds in both rural and urban areas. Holding all other variables constant, the odds of registering for prenatal care increases by 35%, 106%, and 180% respectively for primary, secondary and higher secondary levels of schooling relative to illiterates in rural areas. Similar results are found regarding use of prenatal care in rural areas. The odds of using prenatal care increase by 34%, 104% and 171% respectively for the three educational dummies. It can be clearly seen that educated women are more likely to have received tetanus toxoid and IFA tablets, the medications necessary for pregnant women. In urban areas, we find similarly strong results regarding the importance of education in utilization of prenatal care. As far as the extent of utilizing prenatal care is concerned, the negative binomial regression results show that educational dummies are positively significant at the 1% level of significance. Our results show that having primary, secondary and higher secondary levels of education lead to an increase in visits to prenatal care centres by 23%, 48% and 73% in rural areas and 28%, 52% and 91% in urban areas.

The positive contribution of education in the utilization of postnatal care and institutional birth. can be clearly seen from Tables 9a and 9b. Our results show that the odds of registering for postnatal care increase by 31%, 46% and 117% respectively for primary, secondary and higher secondary levels of schooling relative to illiterates in rural areas. For the use of postnatal care, the corresponding odds ratios in rural areas are 28%, 45% and 108%. In urban areas, the corresponding odds ratios for postnatal registration are 32%, 72% and 140%, and the odds ratios for postnatal use are 32%, 71% and 141% for primary, secondary and higher secondary and above. As far as the extent of utilization of postnatal care is concerned, our results show that having primary, secondary and higher secondary levels of education leads to an increase in visits to postnatal care centres by 24%, 36% and 69% in rural areas and 25%, 46% and 77% in urban areas.

Consistent with the findings in the literature, our empirical results show that the mother's education is a strong, positive determinant of registration and utilization of maternal healthcare services in both rural and urban areas. Moreover, we find that the incremental effects of education are

Table 8a. Determinants of prenatal care utilization in rural areas: logistic regression estimation
(All specifications include a set of State variables)

Variable	Registered for Prenatal Care	Utilized Prenatal Care	Tetanus Toxoid Received	IFA Tablets Received
	Odds Ratio	Odds Ratio	Odds Ratio	Odds Ratio
Mother's age	0.984*** (0.003)	0.985*** (0.003)	0.989*** (0.003)	0.990*** (0.003)
Mother's education – illiterate (reference category)				
Primary	1.352*** (0.064)	1.336*** (0.063)	1.549*** (0.075)	1.340*** (0.062)
Secondary	2.060*** (0.130)	2.042*** (0.129)	2.295*** (0.152)	1.995*** (0.121)
≥ Higher secondary	2.799*** (0.379)	2.706*** (0.365)	3.176*** (0.507)	2.241*** (0.292)
Number of women in the household	1.052*** (0.019)	1.053*** (0.019)	1.063*** (0.019)	1.026 (0.018)
Caste – upper caste (reference category)				
Scheduled caste or tribe	1.034 (0.042)	1.039 (0.043)	0.885*** (0.035)	1.057 (0.042)
Awareness on immunization	4.349*** (0.234)	4.514*** (0.246)	5.979*** (0.283)	4.087*** (0.219)
Awareness on ORT	1.095** (0.046)	1.102** (0.046)	1.088** (0.046)	1.279*** (0.046)
Average distance to the maternity or child centre – less than 2 km (reference category)				
2–5 km	0.782*** (0.046)	0.804*** (0.047)	0.936 (0.056)	0.896* (0.051)
5–10 km	0.716*** (0.042)	0.728*** (0.042)	0.936 (0.054)	0.850*** (0.048)
≥ 10 km	0.666*** (0.035)	0.669*** (0.035)	0.782*** (0.041)	0.846*** (0.043)
Bus service	1.269*** (0.052)	1.286*** (0.053)	1.332*** (0.054)	1.256*** (0.050)
McKelvey and Zavoina's R^2	0.474	0.480	0.388	0.418
Log likelihood	-9191.554	-9140.81	-9561.875	-9494.333
Observations	19032	19032	18950	18702
Test of interactions effects (interaction of bus service and distance variables)				
$\chi^2(3)$	7.72**	7.15*	2.76	2.27
$P > \chi^2(3)$	0.0521	0.0672	0.4305	0.5183

Robust standard errors in parentheses
*Significant at 10%. **Significant at 5%. ***Significant at 1%.

substantially higher since the magnitude of each education coefficient is substantially higher than the preceding level of education in all models. In order to attain the Millennium Development Goals, one of the government of India's long-term strategies is to invest in secondary and higher secondary education for girls. Adequate investment in education would produce better health outcomes for mothers and children and improve the health status of Indian women.

Table 8b. Determinants of prenatal care utilization in urban areas: logistic regression estimation ***(All specifications include a set of State variables)***

Variable	Registered for Prenatal Care	Utilized Prenatal Care	Tetanus Toxoid Received	IFA Tablets Received
	Odds Ratio	Odds Ratio	Odds Ratio	Odds Ratio
Mother's age	0.980*** (0.005)	0.978*** (0.005)	0.986** (0.006)	0.987*** (0.005)
Mother's education – illiterate (reference category)				
Primary	1.685*** (0.116)	1.637*** (0.112)	1.614*** (0.122)	1.370*** (0.088)
Secondary	2.594*** (0.179)	2.505*** (0.171)	2.476*** (0.196)	1.702*** (0.106)
≥ Higher secondary	4.611*** (0.411)	4.198*** (0.362)	3.766*** (0.405)	2.647*** (0.205)
Number of women in the household	1.012 (0.024)	1.000 (0.024)	1.125*** (0.032)	1.080*** (0.023)
Caste – upper caste (reference category)				
Scheduled caste or tribe	0.953 (0.062)	0.942 (0.061)	0.813*** (0.056)	1.049 (0.062)
Awareness on immunization	4.168*** (0.384)	4.054*** (0.370)	5.983*** (0.537)	3.530*** (0.316)
Awareness on ORT	1.381*** (0.088)	1.396*** (0.088)	1.204*** (0.086)	1.571*** (0.090)
McKelvey and Zavoina's R^2	0.386	0.372	0.284	0.274
Log likelihood	-4894.261	-5031.0129	-4033.475	-5847.232
Observations	11337	11337	11300	11196

Robust standard errors in parentheses
*Significant at 10%. **Significant at 5%. ***Significant at 1%.

The effect of age of women on prenatal care registration and utilization is negative and statistically significant across all models in both rural and urban areas. But the magnitude of the effect of age is very small. The effect of age on postnatal care registration and utilization is statistically insignificant in both rural and urban areas. Although the magnitudes are small, age is found to be negatively significant for institutional birth and visits to prenatal care centres.

Age of mother captures past experience related to pregnancy, childbirth and care of infants. The inverse relationship between age of the mother and decisions to register and utilize prenatal care may reflect accumulated experience, including a reduced demand for prenatal care because, for

Table 9a. Determinants of institutional birth and postnatal care utilization in rural areas: logistic regression estimation *(All specifications include a set of State variables)*

Variable	Institutional Birth	Registered for Postnatal Care	Utilized Postnatal Care
	Odds Ratio	Odds Ratio	Odds Ratio
Mother's age	0.979*** (0.005)	0.998 (0.004)	0.997 (0.004)
Mother's education – illiterate (reference category)			
Primary	1.872*** (0.109)	1.314*** (0.065)	1.277*** (0.064)
Secondary	3.705*** (0.247)	1.456*** (0.088)	1.453*** (0.089)
≥ Higher secondary	6.083*** (0.808)	2.171*** (0.267)	2.081*** (0.255)
Number of women in the household	1.036 (0.024)	0.962** (0.019)	0.964* (0.019)
Caste – upper caste (reference category)			
Scheduled caste or tribe	0.644*** (0.034)	1.027 (0.044)	1.026 (0.045)
Awareness on immunization	1.665*** (0.134)	2.604*** (0.171)	2.805*** (0.191)
Awareness on ORT	1.168*** (0.061)	1.230*** (0.054)	1.221*** (0.054)
Average distance to the maternity or child centre -- less than 2 km (reference category)			
2–5 km	0.973 (0.066)	0.760*** (0.044)	0.777*** (0.046)
5–10 km	0.920 (0.065)	0.732*** (0.044)	0.746*** (0.045)
≥ 10 km	0.840*** (0.054)	0.757*** (0.041)	0.751*** (0.041)
Bus service	1.487*** (0.078)	1.169*** (0.052)	1.178*** (0.053)
McKelvey and Zavoina's R^2	0.423	0.271	0.283
Log likelihood	-6105.931	-8300.214	-8097.22
Observations	16592	16592	16592
Test of interactions effects (interaction of bus service and distance variables)			
$\chi^2(3)$	13.15***	8.56**	5.66
$P > \chi^2(3)$	0.0043	0.0357	0.1295

Robust standard errors in parentheses
*Significant at 10%. **Significant at 5%. ***Significant at 1%.

many mothers, there were no serious complications with previous pregnancies or with the health of the infants involved. Alternatively, a negative sign for the age variable can be seen as evidence of diminishing willingness within a household to "invest" in the good health of another child. Such a decision may well be shaped by increased knowledge and experience for a number of women who had delivered previously with relative ease and without complications.

Table 9b. Determinants of institutional birth and postnatal care utilization in urban areas: logistic regression estimation *(All specifications include a set of State variables)*

Variable	Institutional Birth	Registered for Postnatal Care	Utilized Postnatal Care
	Odds Ratio	Odds Ratio	Odds Ratio
Mother's age	0.991* (0.005)	1.002 (0.005)	1.002 (0.005)
Mother's education – illiterate (reference category)			
Primary	1.713*** (0.118)	1.322*** (0.084)	1.321*** (0.085)
Secondary	3.744*** (0.255)	1.718*** (0.104)	1.715*** (0.104)
≥ Higher secondary	13.268*** (1.329)	2.405*** (0.167)	2.413*** (0.168)
Number of women in the household	1.080*** (0.026)	1.006 (0.020)	1.006 (0.020)
Caste – upper caste (reference category)			
Scheduled caste or tribe	0.612*** (0.041)	0.940 (0.054)	0.960 (0.056)
Awareness on immunization	2.279*** (0.228)	2.321*** (0.234)	2.242*** (0.228)
Awareness on ORT	1.355*** (0.089)	1.305*** (0.076)	1.279*** (0.075)
McKelvey and Zavoina's R^2	0.449	0.150	0.144
Log likelihood	-4669.362	-6417.657	-6399.333
Observations	10179	10179	10179

Robust standard errors in parentheses
*Significant at 10%. **Significant at 5%. ***Significant at 1%.

The Effect of Household Characteristics

The number of women in the household has a positive effect on the registration and use of prenatal care in rural areas, where registration for prenatal care increases with each additional woman in a family. However, the effect of the number of additional women is positively significant on receiving tetanus toxoid and IFA tablets in urban areas, but is significant only for tetanus toxoid in rural areas. The number of women in the household has a positive effect on the number of visits to prenatal health centres in rural areas but is insignificant in urban areas. Additional women in the household is also positively associated with institutional birth in urban areas, but is insignificant in rural areas. As

Table 10. Determinants of pre- and postnatal care utilization in rural and urban areas: negative binomial regression estimates *(All specifications include a set of State variables)*

Variable	Prenatal Care Utilization		Postnatal Care Utilization	
	Rural Areas	Urban Areas	Rural Areas	Urban Areas
	Coefficient	Coefficient	Coefficient	Coefficient
Mother's age	-0.005** (0.002)	-0.006*** (0.002)	0.001 (0.003)	0.001 (0.003)
Mother's education – illiterate (reference category)				
Primary	0.203*** (0.027)	0.248*** (0.029)	0.216*** (0.043)	0.223*** (0.049)
Secondary	0.395*** (0.031)	0.420*** (0.026)	0.307*** (0.051)	0.382*** (0.046)
≥ Higher secondary	0.549*** (0.055)	0.646*** (0.028)	0.527*** (0.097)	0.574*** (0.049)
Number of women in the household	0.028*** (0.010)	0.004 (0.007)	-0.016 (0.017)	0.008 (0.013)
Caste – upper caste (reference category)				
Scheduled caste or tribe	0.006 (0.024)	-0.062** (0.024)	0.043 (0.037)	-0.046 (0.043)
Awareness on immunization	1.044*** (0.046)	0.758*** (0.059)	0.920*** (0.063)	0.634*** (0.088)
Awareness on ORT	0.105*** (0.024)	0.156*** (0.025)	0.201*** (0.037)	0.165*** (0.044)
Average distance to the maternity or child centre – less than 2 km (reference category)				
2–5 km	-0.118*** (0.029)		-0.216*** (0.050)	
5–10 km	-0.178*** (0.032)		-0.308*** (0.050)	
≥ 10 km	-0.150*** (0.030)		-0.266*** (0.047)	
Bus service	0.139*** (0.026)		0.181*** (0.039)	
Constant	0.306*** (0.086)	0.655*** (0.085)	-1.283*** (0.140)	-0.920*** (0.139)
Log likelihood	-29554.331	-25019.923	-15901.003	-14194.532
Estimate of (	.979	.450	2.645	1.452
LR test (H0: (=0)	7700.92***	4411.92***	6076.58***	3810.83***
Observations	19032	11337	16592	10179
Test of interactions effects (interaction of bus service and distance variables)				
$\chi^2(3)$	1.83		3.97	
$p > \chi^2(3)$	0.6074		0.2644	

Robust standard errors in parentheses
*Significant at 10%. **Significant at 5%. ***Significant at 1%.

far as postnatal care is concerned, we find that additional women in the household tends to decrease registration and use of postnatal care in rural areas but is insignificant in urban areas. It is statistically insignificant for the number of visits to postnatal centres in both rural and urban areas.

This suggests the role of additional women in the family is a source of additional knowledge in some circumstances, especially utilization of prenatal care and institutional birth. However, for postnatal care, other women in a household may provide assistance for certain types of this care in rural areas.

Members of the scheduled caste and the scheduled tribe are less likely to have received tetanus toxoid: the odds of receiving it decrease by about 19% in urban areas and 12% in rural areas. The effect of this variable on all other prenatal care models is statistically insignificant in both rural and urban areas, except that it is negatively significant for the number of visits in urban areas. Members of the scheduled caste and the scheduled tribe are less likely to have an institutional birth: the odds decrease by about 39% in urban and 36% in rural areas. We do not find any statistically significant effect of the scheduled caste/scheduled tribe variable on registration and utilization of postnatal care in both rural and urban areas.

Our results suggest that members of the scheduled caste/scheduled tribe use significantly less maternal healthcare services in some instances, especially, they are less likely to have received tetanus toxoid and less likely to deliver in institutions. We cannot determine whether this indicates discrimination or whether social and cultural factors are involved. It is likely that cultural factors may facilitate the delivery of scheduled caste/scheduled tribe women at home (perhaps in the presence of traditional birth attendants) and inhibit delivering in institutions. If this is so, then education and awareness among women in those groups would likely improve the rate of institutional births. To the extent that lower caste women are unable to access institutional facilities, more targeted programs need to be tailored to improve access among those population groups.

A willingness to choose maternal–child health is shaped by knowledge of what is available and some knowledge of the likely effects of particular treatments or services. Of the four variables in the survey that measure awareness, two can be used as indictors of such knowledge: First, that any member of the household is aware of immunization specifically for pregnant women and second, that any member of the household is aware of oral rehydration as treatment for diarrhea. For both variables, the coefficients are positive and statistically significant in all models. This indicates that household knowledge of specific health services has a strong and positive effect on prenatal care, institutional delivery and postnatal care.

Consistent with the theoretical discussion, our empirical results show that knowledge and awareness at the household level is another strong, positive determinant of registration and utilization of maternal healthcare services in both rural and urban areas. Another strategy to improve the health status of Indian women and accomplish the Millennium Development Goals is to put a strong emphasis on awareness within households and local communities.

The Impact of Accessibility to Health Services

As is shown in the literature, an ability to act on knowledge of health services is affected by access to such services. In rural areas, a measure of access is the distance to the nearest health clinic. Using within two kilometers as the reference, distance consistently has a negative effect on the registration for and utilization of pre- and postnatal care and on the choice of childbirth facility. For pre- and postnatal care registration and utilization, the negative effect is stronger, whereas for the choice of a health institution for childbirth, the negative effect is evident only for distances beyond 10 kilometers. Given the negative impact of distance in rural areas, the availability of bus services between the home village and the health clinic can serve to overcome this barrier. Regression results bear this out: Access to bus service is an important, positive determinant of maternal healthcare services in rural India.

In order to assess the role of both distance and access to bus service, we extend our analysis by including interaction of distance variables with the indicator for bus service. It is necessary to test

the interaction effects to determine whether the model fits over and above the case where no interaction terms are included (Jaccard, 2001). The χ^2 test results are reported at the bottom of Tables 8a, 9a and 10 and suggest that the interaction terms are statistically significant in only four cases. However, interpretation of an interaction term is very complex and the literature lacks a consensus. For instance, Jaccard (2001) suggests computing odds ratios manually while Ai and Norton (2003) argue that marginal effects should be the focus, and odds ratios have no meaningful interpretation for the interaction terms. We report both direct and indirect effects of distance and bus service for these four cases in which the interaction terms are statistically significant. The interaction effects are presented in the Appendix and the detailed results are available from the authors upon request. It can be seen from the Appendix that the effect of the interaction terms on the probability of registration and utilization of prenatal care is positive for less than 10 kilometers of distance to prenatal care centre, and negative beyond 10 kilometers. This suggests that bus service reduces the negative effect of distance within a 10-kilometer range. However, for institutional birth, the interaction effect is consistently positive, suggesting that bus service reduces the negative effect of distance in choosing institutions for child birth. For postnatal care registration, the interaction effects are negative and the two interaction terms are not individually significant.

Our results suggest that an important strategy to improve access to maternal healthcare services in rural areas is to reduce distance to health centres. However, reducing distance may be a long-term strategy, as it would generally take a huge investment in the infrastructure to build health centres within an acceptable distance. Another way to minimize the effect of distance and improve access to care in the short-term is to provide regular public transportation facilities to the nearest health centre outside the village so that mothers can access the necessary care. At the same time, adequate capacity in existing health centres needs to be built to meet the challenges of additional demand pressures.

7. Conclusions and Policy Implications

Other things equal, the level of schooling that mothers have completed significantly increases the likelihood of a decision to register for pre-and postnatal care and to use available maternal–child health services. Analysis of decisions to utilize maternal–child healthcare indicates that awareness of specific pre- and postnatal care procedures have a strong, direct effect on decisions to register for and utilize both pre- and postnatal care. In rural areas, along with awareness of healthcare programs, access to healthcare facilities is an important determinant of the decision to utilize the programs. Taken together, these conclusions point to the importance of education, knowledge of the health production function and access to available health-care facilities as key variables that shape decisions to utilize maternal–child healthcare.

In order to attain the Millennium Development Goals and improve the health status of Indian women and children, India needs to adopt a multifaceted strategy. In spite of India's satisfactory economic growth in the post-economic-reform era, it is neither necessary nor binding that the benefits of economic growth will trickle down to the health sector. The experience of Haryayna, high economic growth rate coupled with worse health outcomes and low literacy is well known in this regard. The long-term strategy lies in the educational attainments of female children and building adequate capacity in the social infrastructure. Although India has made substantial progress in improving literacy and expanding primary and secondary educational facilities in the past decade, concerted efforts need to be made in the area of enrollment and retention of female students in the secondary and higher secondary educational institutions in both rural and urban areas. Universal access to comprehensive primary healthcare services on a continuing basis, including maternal healthcare services, is the basic foundation for development and growth. Although India is a signatory to the Alma Ata Declaration, more needs to be done in terms of building adequate infrastructure, along with trained manpower and reasonable distance within various jurisdictions, especially in the rural and remote areas. The long-term strategy needs to be supported by various short-term strategies. Dissemination of knowledge and awareness of health-seeking behaviours would allow households, and women in particular, to make informed choices about maternal–child healthcare.

This can be done through Gram Panchayats and Municipalities (the lowest levels of democratic institutions in rural and urban India) or Non-Governmental Organizations or similar local institutions. This indicates that the government's existing IEC program needs to be strengthened and extended to include the health awareness component. Another short-term strategy would be to provide good transportation facilities from residential areas to primary, secondary and tertiary healthcare facilities to improve access to and use of basic healthcare services. In order to meet the challenges of additional demand pressures, it would be necessary to create additional capacity within existing health infrastructures.

The analysis in this paper is limited to whether or not women decide to register for and use pre- and postnatal care and the selection of a place for childbirth. It does not give information on the differences in the quality of healthcare received, nor does it asses the relative advantages of public versus private health facilities. Additional analysis is required to enable a detailed assessment of the effects of India's approach to delivering maternal–child healthcare.

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Endnotes

1 The details on sample design are described in the Report Number 445, National Sample Survey Organization, Government of India, 1998.

2 The missing category excludes 62 cases of stillbirth, 88 cases of spontaneous abortion, 27 cases of induced abortion, and 17 cases of medical termination pregnancy in urban areas. The corresponding numbers for the rural areas are 113, 165, 39 and 22 respectively.

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Appendix
Interaction Effects of Bus Service and Distance Variables in Rural Areas

Logit (.) = $\beta_0 + \beta_1$BUS + β_2 DISTANCE1 + β_3 DISTANCE2 + β_4 DISTANCE3 + β_5 BUS*DISTANCE1 + β_6 BUS*DISTANCE2 + β_7 BUS*DISTANCE3 + $\beta\mathbf{X}$
Where DISTANCE1 = 2-5 km, DISTANCE2 = 5-10 km and DISTANCE3 = ³10 km

a) Registered for Prenatal Care

β_1 = 0.391654***, β_2 = -0.12092, β_3 = -0.27907***, β_4 = -0.27302***, β_5 = -0.21665*, β_6 = -0.06451 and β_7 = -0.25025***

BUS Service	Distance	Logit	Logit Diff.	Estimate
0	<2 km	$\beta_0 + \beta\mathbf{X}$		
1	<2 km	$\beta_0 + \beta_1 + \beta\mathbf{X}$	β_1	0.391654
0	2-5 km	$\beta_0 + \beta_2 + \beta\mathbf{X}$	β_2	-0.12092
1	2-5 km	$\beta_0 + \beta_1 + \beta_2 + \beta_5 + \beta\mathbf{X}$	$\beta_1 + \beta_2 + \beta_5$	0.054086
0	5-10 km	$\beta_0 + \beta_3 + \beta\mathbf{X}$	β_3	-0.27907
1	5-10 km	$\beta_0 + \beta_1 + \beta_3 + \beta_6 + \beta\mathbf{X}$	$\beta_1 + \beta_3 + \beta_6$	0.048073
0	≥10 km	$\beta_0 + \beta_4 + \beta\mathbf{X}$	β_4	-0.27302
1	≥10 km	$\beta_0 + \beta_1 + \beta_4 + \beta_7 + \beta\mathbf{X}$	$\beta_1 + \beta_4 + \beta_7$	-0.13161

b) Utilized Prenatal Care

β_1 = 0.404366***, β_2 = -0.09158, β_3 = -0.2585***, β_4 = -0.26955***, β_5 = -0.217*, β_6 = -0.07386 and β_7 = -0.24511***

BUS Service	Distance	Logit	Logit Diff.	Estimate
0	<2 km	$\beta_0 + \beta\mathbf{X}$		
1	<2 km	$\beta_0 + \beta_1 + \beta\mathbf{X}$	β_1	0.404366
0	2-5 km	$\beta_0 + \beta_2 + \beta\mathbf{X}$	β_2	-0.09158
1	2-5 km	$\beta_0 + \beta_1 + \beta_2 + \beta_5 + \beta\mathbf{X}$	$\beta_1 + \beta_2 + \beta_5$	0.095782
0	5-10 km	$\beta_0 + \beta_3 + \beta\mathbf{X}$	β_3	-0.2585

1	5-10 km	$\beta_0 + \beta_1 + \beta_3 + \beta_6 + \beta\mathbf{X}$	$\beta_1 + \beta_3 + \beta_6$	0.072001
0	≥10 km	$\beta_0 + \beta_4 + \beta\mathbf{X}$	β_4	-0.26955
1	≥10 km	$\beta_0 + \beta_1 + \beta_4 + \beta_7 + \beta\mathbf{X}$	$\beta_1 + \beta_4 + \beta_7$	-0.11029

c) Institutional Birth

β_1 = 0.272163***, β_2 = -0.02585, β_3 = -0.11925, β_4 = -0.39273***, β_5 = -0.03133, β_6 = 0.032536 and β_7 = 0.371896***

BUS Service	Distance	Logit	Logit Diff.	Estimate
0	<2 km	$\beta_0 + \beta\mathbf{X}$		
1	<2 km	$\beta_0 + \beta_1 + \beta\mathbf{X}$	β_1	0.272163
0	2-5 km	$\beta_0 + \beta_2 + \beta\mathbf{X}$	β_2	-0.02585
1	2-5 km	$\beta_0 + \beta_1 + \beta_2 + \beta_5 + \beta\mathbf{X}$	$\beta_1 + \beta_2 + \beta_5$	0.214982
0	5-10 km	$\beta_0 + \beta_3 + \beta\mathbf{X}$	β_3	-0.11925
1	5-10 km	$\beta_0 + \beta_1 + \beta_3 + \beta_6 + \beta\mathbf{X}$	$\beta_1 + \beta_3 + \beta_6$	0.185453
0	≥10 km	$\beta_0 + \beta_4 + \beta\mathbf{X}$	β_4	-0.39273
1	≥10 km	$\beta_0 + \beta_1 + \beta_4 + \beta_7 + \beta\mathbf{X}$	$\beta_1 + \beta_4 + \beta_7$	0.251324

d) Registered for Postnatal Care

β_1 = 0.203582***, β_2 = -0.11513, β_3 = -0.3173***, β_4 = -0.26842***, β_5 = -0.27016*, β_6 = 0.031844 and β_7 = 0.007308

BUS Service	Distance	Logit	Logit Diff.	Estimate
0	<2 km	$\beta_0 + \beta\mathbf{X}$		
1	<2 km	$\beta_0 + \beta_1 + \beta\mathbf{X}$	β_1	0.203582
0	2-5 km	$\beta_0 + \beta_2 + \beta\mathbf{X}$	β_2	-0.11513
1	2-5 km	$\beta_0 + \beta_1 + \beta_2 + \beta_5 + \beta\mathbf{X}$	$\beta_1 + \beta_2 + \beta_5$	-0.18171
0	5-10 km	$\beta_0 + \beta_3 + \beta\mathbf{X}$	β_3	-0.3173
1	5-10 km	$\beta_0 + \beta_1 + \beta_3 + \beta_6 + \beta\mathbf{X}$	$\beta_1 + \beta_3 + \beta_6$	-0.08187
0	≥10 km	$\beta_0 + \beta_4 + \beta\mathbf{X}$	β_4	-0.26842
1	≥10 km	$\beta_0 + \beta_1 + \beta_4 + \beta_7 + \beta\mathbf{X}$	$\beta_1 + \beta_4 + \beta_7$	-0.05753

*Significant at 10%. **Significant at 5%. ***Significant at 1%.

Profile of Female Sex Workers in a Chinese County: Does It Differ by Where They Came from and Where They Work?

Xiaoyi Fang, PhD, Beijing Normal University Institute of Developmental Psychology, Beijing, China

Xiaoming Li, PhD, The Carman and Ann Adams Department of Pediatrics Prevention Research Center, Wayne State University, Detroit, MI, USA

Hongmei Yang, PhD, The Carman and Ann Adams Department of Pediatrics Prevention Research Center, Wayne State University, Detroit, MI, USA

Yan Hong, PhD, Johns Hopkins University School of Public Health, Baltimore, MD, USA

Ran Zhao, PhD, Beijing Normal University Institute of Developmental Psychology, Beijing, China

Baiqing Dong, MD, Guangxi Center for Disease Control and Prevention, Guangxi, China

Wei Liu, MD, Guangxi Center for Disease Control and Prevention, Guangxi, China

Yuejiao Zhou, MD, Guangxi Center for Disease Control and Prevention, Guangxi, China

Shaoling Liang, MD, Guangxi Center for Disease Control and Prevention, Guangxi, China

Bonita Stanton, MD, The Carman and Ann Adams Department of Pediatrics Prevention Research Center, Wayne State University, Detroit, MI, USA

Correspondence: Xiaoming Li, PhD, Prevention Research Center, The Carman and Ann Adams Department of Pediatrics, Wayne State University School of Medicine, 4201 St. Antoine Street, UHC 6-D, Detroit, MI 48201, Tel: 313-745-8663, Fax: 313-745-4993, Email: xiaoming_li@wayne.edu

Abstract

Since the 1980s, informal or clandestine sex work in the service or entertainment industry has spread from municipalities to small towns in most areas of China. Despite recognition of the important role of female sex workers in HIV and STD epidemics in China, limited data are available regarding their individual characteristics and the social and environmental context of their work. Furthermore, most existing studies on commercial sex in China have been conducted in large cities or tourist attractions. Using data from 454 female sex workers in a rural Chinese county, the current study was designed to explore the individual profiles of commercial sex workers and to examine whether the profile and sexual risk behaviour differ by where the female sex workers came from and where they work. The sample in the current study was different from previous studies in a number of key individual characteristics. However, similarly to previous studies, the subjects in the current study were driven into commercial sex by poverty or limited employment opportunities, lived a stressful life, were subject to sexual harassment and related violence, and engaged in a number of health-compromising behaviours including behaviours that put them at risk of HIV/STD infection and depression. The findings of the current study underscore the urgent need for effective HIV/STD prevention, intervention and mental health promotion programs among female sex workers in China. The data in the current study suggest a strong association of individual profile with the economic conditions of work sites and residence status (in-province residency vs. out-of-province residency), which suggests that such efforts must take the social and cultural contextual factors of working environment (and sexual risks) into consideration.

Introduction

The current official estimate of numbers of persons infected with HIV in China exceeds 650,000 (China Ministry of Health 2006). While the number of infected individuals may be relatively small in a country with a population of 1.3 billion, the sharp increase in the prevalence of infection (e.g., over 30% annually) indicates a serious and rapidly deteriorating state of the HIV/AIDS epidemic in China. About two thirds of infections were in individuals 20 to 39 years of age, with a male predominance. Although intravenous drug use and paid blood/plasma donation have been the major sources of infection, it is estimated that 31% of the seropositive cases in China were sexually transmitted (20% heterosexually and 11% homosexually) (Yang et al. 2005b). The resurgence of wide-scale commercial sex since the 1980s has now accelerated to a nationwide dilemma. Commercial sex has long been considered a reservoir, if not a "vector" for transmission of sexual diseases (Asthana and Oostvogels 1995; Davis 1993; Ford and Koetsawang 1991; Karim et al. 1995). Despite recognition of the important role of female sex workers in China's HIV and STD epidemics, limited data are available regarding their individual characteristics and the social and environmental context of their work, which have been shown to be closely related to HIV/STD risk behaviours for women (Logan et al. 2002).

Prostitution in mainland China was declared eradicated in the early 1950s. Since the 1980s, it has emerged as a flourishing industry, a consequence of more political and economic freedom, increased disposable income and liberalized attitudes (Gil et al. 1996; Liao et al. 1996). While the actual number of female sex workers in China is unknown, the number of women engaging in commercial sex in mainland China has been estimated at between 4 and 10 million (Yang et al. 2005b; Huang et al. 2004). Since the 1980s, informal or clandestine sex work in the service or entertainment industry has spread from municipalities to small towns in remote areas in China (Hershatter 1996; Pan 1999).

Recent research addressing women, sex and HIV suggests that most existing HIV/STD behavioural prevention and intervention efforts do not sufficiently consider the range of important contextual and social factors that influence women's sexual behaviours (Kerrigan et al. 2003; Logan et al. 2002; Morisky et al. 2002; Morisky et al. 2006). Studies on female sex workers in China and in other parts of Southeast Asia indicate that the characteristics, knowledge and awareness of HIV, and health behaviours of female sex workers vary by geographic location and work site (Ford et al.

1995; Wirawan et al. 1995; Morisky et al. 2002). The existing literature also suggests an insufficient understanding of female sex workers in more remote Chinese counties and smaller metropolitan or rural areas (as opposed to big cities or tourist spots), especially regarding the women's individual and family characteristics, sexual experience and history of sex work, working and living environment, and health behaviours. While entertainment establishments where these women work vary substantially in the context of working and living (Yang et al. 2005c), little is known about whether the profiles of female sex workers (e.g., demographic characteristics, sexual experience and HIV-related risk behaviours) also differ by the type of working environment.

Therefore, the current study was designed to explore the profiles of Chinese women who provide sex services through entertainment establishments (e.g., restaurants, hotels and hair-salons) in three geographic locations with different levels of economic development and socio-cultural characteristics in a multi-ethnic rural county in China. Our goal was to identify important environmental and individual factors associated with HIV/STD-related sexual risk in order to develop effective HIV/STD prevention programs in these settings. Specifically, this study was designed to (1) explore the profile of the study sample in terms of individual characteristics, sexual experience and history of sex work, working environment and other health behaviours and mental health indicators, and (2) examine whether the profile and sexual risk behaviour differ by where the female sex workers come from (i.e., in-province residency vs. out-of-province residency) and where they work.

Methods

Study Site

The data in the current study were drawn from the baseline assessment of a longitudinal HIV/STD prevention project (Li et al. in press). The project was conducted in H County, a suburban county in Nanning, the capital city of Guangxi Zhuang Autonomous Region ("Guangxi"). Guangxi, one of China's five autonomous and multi-ethnic regions, is located in the southern part of the country. It is bordered by Guangdong Province on the east, the Gulf of Tonkin on the south and Vietnam on the southwest. Because of its central location in southwest China, Guangxi has historically been a transport hub for trade, commerce and tourism in southwest China and South East Asia. Guangxi has a population of 46.8 million, of which 72% are rural residents. The average annual per capita income in 2001 was 6,666 RMB (approximately 800 US dollars) for urban dwellers and 2,321 RMB (approximately 280 US dollars) for rural residents (Guangxi Bureau of Statistics, 2004).

Guangxi has witnessed an alarming rise in HIV prevalence in the past decade. A total of 8,602 HIV infected cases have been officially reported as of the end of 2003, with an estimated number of infected cases as high as 80,000 (Guangxi CDC, 2004). Guangxi ranks third among Chinese provinces in terms of reported seropositive cases. Similarly to the national epidemic, the majority of infected cases are from rural areas. The prosperous economy, international contact and tourism in Guangxi have created a demand and market for commercial sex. According to the statistics from the public security agency, there are at least 50,000 female sex workers in Guangxi, although the actual number is believed to be substantially higher (Liu et al. 2002). Female sex workers provide sexual service primarily through three venues in Guangxi: (1) hotels, restaurants, nightclubs, karaoke bars, dancing halls and other entertainment establishments, (2) barbershops, hair-washing rooms, saunas and massage parlours, and (3) roadside food stalls in rural–urban junctions (Liu et al. 2002).

H County, about 90 kilometres northeast from Nanning, is the most populous county in the Nanning suburban area. H County has jurisdiction over 22 townships with a total population of 1.1 million (94.5% are rural residents). Similarly to other areas of China, residents in H County are roughly divided into "urban" (county seats and towns) and "rural" (villages or rural centres). The population in H County consists of 23 ethnic groups, with the majority of residents being Han (60%) and Zhuang (37%). Zhuang is one of the 55 ethnic minorities in China. The Zhuang ethnic group, concentrated in southwest China, shares a culture similar to that of the Han, China's ethnic majority (92% of the nation's population). Zhuang people have their own dialects but can

also speak the country's official language, Mandarin. Besides its proximity to Nanning, H County is the biggest production and distribution centre for jasmine and jasmine tea in China. The official number of drug users here was 1,976 in 2003. This number has been increasing at a rate of 15% per year. The actual number of drug users is estimated by the county health department to be about 8,000, of which 70% share needles. The reported HIV prevalence among drug users was 20% in 2000 and 25% in 2002. It is estimated that there are about 200 entertainment establishments with more then 2,000 women offering sexual services in the county. The majority of these women are working in restaurants, barbershops and hair-washing rooms.

Sampling and Participants

Participants in the current study were recruited from restaurants, barbershops and hair-washing rooms in three geographic locations in H County: the county seat, a recently established economic development zone in rural–urban junction and one rural township. The county seat has an area of 15 square kilometres with a population of 100,000. The economic zone, about 10 kilometres from the county seat, is an area approximately 5 square kilometres in size. This zone was established in the late 1990s and has more than 100 small factories. The development zone and surrounding areas have a population of 90,000. The rural township is 35 kilometres from the county seat and has a population of 35,000. The workplace (mainly restaurants, hair salons, hair-washing rooms and massage parlours) was employed as the sampling unit. We used ethnographic targeted sampling (Carlson et al. 1994) to identify and recruit participants. First, the research team and local health workers conducted an ethnographic-mapping of establishments that provide sexual services. Ethnographic mapping identified these establishments with information from local healthcare providers (e.g., STD clinicians, obstetricians and gynecologists), taxi drivers, public security agencies, local business owners and residents. The mapping team collected data on the name and address of the establishment, estimated number of sex workers, operation history and contact information of the owner/manager. A total of 85 establishments were identified in the three targeted areas (53 in the county seat, 12 in the development zone and 20 in the township) with an estimated number of greater than 800 female sex workers in these establishments.

Upon completion of the ethnographic mapping, we contacted the owners/managers of these establishments for permission to conduct the study on their premises. Among the 85 establishments, 57 (67%) agreed to participate. After receiving permission from the owner/manager, local outreach workers (mainly health workers from the county anti-epidemic station or local hospitals) approached the women in the establishments who were identified by the owner/manager as female sex workers. Once the women confirmed their sex worker status, outreach workers explained the purpose, procedure, potential benefits and potential risks of the study and invited the women to participate. Women who expressed interest in the study were provided with an informed consent form and were assured of confidentiality and privacy. Of 581 women approached in the 57 workplaces, 454 (78%) agreed to participate and provided appropriate informed consent.

Survey Procedure

Each woman who provided appropriate informed consent was assigned a unique personal code number and given a self-administered questionnaire entitled "Health Survey for Women in the Service Sectors." The questionnaire contains four main components: Demographic information, living and working conditions, health behaviours with sexual experience and history of sex work, and HIV/AIDS-related knowledge and attitudes. The questionnaire takes 45–60 minutes to complete. It was extensively pilot tested in two waves among 22 women (7 in wave one and 15 in wave two) to ensure the appropriateness of content and language for the study population. Participants completed the questionnaire in a separate room or a private space and recorded the unique personal code number on the questionnaire. No other person (e.g., co-worker, employer, or customer) was allowed to stay with the participant during the survey, except for a trained interviewer who could provide assistance if needed. For participants with limited literacy (about 10%), the interviewer read

each question and response options aloud from the interviewer's copy of the questionnaire, while participants marked the response on their own copy (to ensure that the interviewer would not see their answers).

Most of the outreach workers and interviewers were healthcare workers from the county anti-epidemic station and local hospitals. They were carefully chosen and rigorously trained (and re-trained) on survey procedures and confidentiality issues and were asked to sign a pledge to protect participants' privacy and confidentiality. The study protocol was approved by the Institutional Review Boards at Wayne State University in the United States and Beijing Normal University and Guangxi Autonomous Region Centers for Disease Control and Prevention in China.

Measures

Individual and family characteristics. Participants were asked to provide information regarding their demographic characteristics, including age, year of formal schooling; ethnicity (Han, Zhuang, other); place of home residence (Guangxi vs. non-Guangxi); type of hometown (rural village, small town/county seat, small/medium city, major city); marital status (single without boyfriend, single with boyfriend or ever married); whether the participant had a child; living arrangements in H County, including living alone, with family member/relative (husband, child, boyfriend, parents, sibling, other relatives) or with other female sex workers; and workplaces, including restaurants and other dining services ("Restaurant") and barbershops, hair-washing rooms, message parlours and saunas ("Hair salon").

Sexual experience and history of sex work. Information collected on the participant's sexual experience included age of sexual onset, length of time being a sex worker, history of pregnancy and abortion, partner of first sexual intercourse (customer, boyfriend, husband, friend or other acquaintance, other), occupation prior to being a sex worker (student, peasant, migrant worker, unemployed, other); family members who knew that she was a sex worker and the reasons for being a sex worker.

Working environment. We assessed the contextual factors of working environment using a number of questions: monthly income (in Chinese currency Yuan), time interval between change of workplace (less than 3 months, every 3 to 6 months, every 6 to 12 month, more than 12 months, never changed), money management (e.g., giving most to parents, managed by husband or boyfriend, saved by self, spent most), number of sex workers in the current workplace, experience with law enforcement (e.g., was arrested, was fined, was sent to the Women's Education Centre), who were most of her clients (businessmen from other places, migrant workers, local peasants, local town residents).

Sexual behaviour and HIV-related risk. Participants were asked about the average number of clients per week, maximum number of clients per day, number of their stable sexual partners (including long-term customers), being raped or forced to have sex in the last 6 months, having had a "sugar-daddy" (i.e., a rich man) in the last 6 months, exchanging sex for drugs, sex under the influence of alcohol and sex with clients during menstruation. Participants were also asked about their sex acts with clients, including group sex, oral sex and anal sex (yes/no), and any use of protective measures with clients and stable partners in recent sexual encounters (e.g., last month). Participants were also asked about their personal history of STD infection.

Substance use/abuse and mental health indicators. Other health behaviours in the previous 6 months that were assessed included daily smoking (yes/no), alcohol intoxication (yes/no), illegal drug use (yes/no) and injection drug use (yes/no). Mental health indicators included life satisfaction, suicidal thoughts and actual suicide attempts in the previous 6 months (yes/no), psychological worries, attitudes toward sex work and plans for the future. Life satisfaction was measured using 2 items (i.e., satisfaction with work and satisfaction with life) with a 5-point scale (1 = very unsatisfied to 5 = very satisfied). Participants were asked to indicate what they worried about most in their daily life from a list of 8 items: being known as a sex worker by family/relatives, being abused by customers, not making enough money, getting pregnant, being raped or robbed, getting an STD,

getting HIV/AIDS and being arrested by the police. Participants' attitudes toward sex work were measured by 4 items: "The only difference in making money is an easy or hard way, but there is no right or wrong way," "To me sex work is the same as any other job," "If I had a choice, I would not be a sex worker," "If I have been a sex worker once, it will be very difficult for me to do anything else," and "It does not make any difference if you do sex work just for one day or for your whole life." Future plans included having both a short-term plan for her work (do it for a few more years, has no plan currently, wants to change to other job immediately) and a long-term plan (to have her own business, to get married and/or have a child).

Statistical Analysis

Chi-square (for categorical variables) and ANOVA (for continuous variables) were employed to assess the group differences in individual and family characteristics, sexual experience and history of sex work, working conditions, substance use/abuse and mental health indicators. All statistical analyses were performed using SPSS V11.5 for Windows.

Results

Demographic characteristics

The final sample of 454 women were recruited from 34 restaurant-type establishments (n = 380) and 23 hair salons, hair-washing rooms or massage parlours (n = 74) in three geographic locations (243 or 54% from the county seat, 131 or 29% from the development zone and 80 or 18% from the township). Participants had a mean age of 23.50 years (SD = 5.09) and an average of 5.69 years of formal schooling (SD = 3.30); about 70% were younger than 25 years of age (Table 1). More than one half of the women had finished no more than 6 years of formal schooling, and only 7% had more than 9 years of school. About one half of the sample was of Han ethnicity; about one third was of Zhuang ethnicity. Other ethnicities (e.g., Jingbo, Dong) made up one seventh of the sample. Among the participants, 299 (66%) were Guangxi natives, of whom 49 (16%) were H County residents. Eighty percent of participants had grown up in rural villages, and 13% had grown up in the county seat. Sixty percent of the sample was never married, with one fourth currently having a boyfriend/fiancée. A small proportion were divorced (n = 20). Among H County participants, 77% were living with other female sex workers, 14% were living alone and 12% with family members (child, husband, parents and sibling), boyfriend or relatives. Although nearly 40% had children, including 92% (n = 166) of married participants and 2% of single (n = 6), only a small fraction (n = 2) had their children with them in H County.

As shown in Table 1, the sample differed significantly by working location in a number of demographic characteristics. Compared with women working in the county seat or development zone, more women in the township were younger than 23 years of age (56%), had no more than 6 years of formal schooling (74%), were from an ethnic minority (61%), were Guangxi natives (68%) and rural residents (95%). More women in the township (93%) than their counterparts in the county seat (72%) or development zone (77%) currently lived with other female sex workers (p < .0001).

Compared to Guangxi natives, non-Guangxi residents were older (26.95 vs. 21.76, p < .0001), had more years of formal schooling (6.62 vs. 5.23, p < .0001), were of Han ethnicity (96% vs. 34%, p < .0001), were less likely to be rural residents (73% vs. 83%, p < .001), were married (72% vs. 24%, p < .0001) and had more children (72% vs. 22%, p < .0001). Living arrangements in H County were similar between Guangxi residents and non- residents, with about three fourths living with other female sex workers.

Sexual Experience and History of Sex Worker

Sex debut. The age of sexual debut for the entire sample was 18.62 years (Table 2). Age of sexual onset ranged from 13 to 27 years, with the majority (85%) having had sex before 20 years of age.

About 4% had had sex between 13 and 15 years of age. While the age of sexual onset was similar across the work location, Guangxi residents were younger than non-residents at the time of first sexual intercourse (18.10 vs. 19.64, $p < .0001$).

Table 1. Demographic characteristics of 454 female sex workers in Guangxi, China

		Work Location			Residence Status	
	Overall	**City**	**Zone**	**Town**	**Guangxi**	**Non-Guangxi**
N (%)	454 (100%)	243 (54%)	131 (29%)	80 (18%)	299 (66%)	155 (34%)
Mean age	23.50 ± 5.09	23.36 ± 4.69	24.08 ± 5.62	22.99 ± 5.34	21.76 ± 4.04	26.95 ± 5.23****
Age group ≤22	234 (52%)	125 (51%)	64 (49%)	45 (56%)	192 (62%)	40 (27%)****
Schooling						
0–6 years	260 (58%)	127 (53%)	74 (58%)	59 (74%)*	187 (63%)	71 (48%)**
7–9 years	158 (35%)	96 (40%)	46 (36%)	16 (20%)	96 (32%)	61 (41%)
>10 years	32 (7%)	19 (8%)	8 (6%)	5 (6%)	15 (5%)	17 (11%)
Mean schooling	5.69 ± 3.30	6.12 ± 3.33	5.81 ± 2.97	4.19 ± 3.34****	5.23 ± 3.36	6.62 ± 3.00****
Ethnicity						
Han	243 (55%)	130 (54%)	82 (66%)	31 (39%)**	99 (34%)	145 (96%)****
Zhuang	142 (32%)	81 (34%)	32 (26%)	29 (37%)	138 (47%)	2 (1%)
Other	61 (14%)	31 (13%)	11 (9%)	19 (24%)	57 (19%)	4 (3%)
Residence						
Guangxi	299 (66%)	180 (74%)	65 (50%)	54 (68%)****	299 (100%)	n/a
County	49 (11%)	28 (12%)	16 (12%)	5 (6%)	49 (16%)	n/a
Type of Hometown						
Rural	351 (80%)	178 (74%)	97 (80%)	76 (95%)**	243 (83%)	105 (73%)***
County seat	59 (13%)	39 (16%)	16 (13%)	4 (5%)	40 (14%)	19 (13%)
Small/medium city	19 (4%)	13 (5%)	6 (5%)	0	5 (2%)	13 (9%)
Major city	12 (3%)	10 (4%)	2 (2%)	0	5 (2%)	7 (5%)
Marital Status						
Single without boyfriend	161 (36%)	85 (35%)	42 (32%)	34 (43%)***	131 (44%)	28 (19%)****
Single with boyfriend	110 (24%)	76 (31%)	23 (18%)	11 (14%)	95(32%)	14 (9%)
Married	181 (40%)	81 (34%)	65 (50%)	35 (44%)	71 (24%)	109 (72%)
Have Children	173 (39%)	75 (31%)	66 (53%)	32 (40%)****	64 (22%)	108 (72%)****
Living Arrangements						
Alone	63 (14%)	36 (15%)	23 (18%)	5 (6%)**	41 (14%)	22 (22%)

Table 1. Continued

With other sex workers	350 (77%)	175 (72%)	101 (77%)	74 (93%)***	229 (77%)	118 (78%)
With family member	53 (12%)	39 (16%)	12 (9%)	2 (3%)**	37 (12%)	16 (11%)
Husband	7 (4%)	5 (6%)	2 (3%)	0	6 (9%)	1 (1%)
Child	2 (<.5%)	0	2 (2%)	0	2 (1%)	0
Boyfriend	27 (6%)	20 (8%)	6 (5%)	1 (1%)	17 (6%)	10 (7%)
Parents	4 (1%)	2 (1%)	2 (2%)	0	3 (1%)	1 (1%)
Sibling	13 (3%)	8 (3%)	5 (4%)	0	11 (4%)	2 (1%)
Relatives	7 (2%)	5 (2%)	1 (1%)	1 (1%)	4 (1%)	3 (2%)
Workplace						
Restaurant	380 (84%)	169 (70%)	131 (100%)	80 (100%)****	250 (84%)	126 (83%)
Hair salon	74 (16%)	74 (31%)	0	0	49 (16%)	25 (17%)

*$p < .05$. **$p < .01$. ***$p < .001$. ****$p < .0001$.

Length of sex work. Overall, participants had a history of being a sex worker for just over 1 year (Table 2). Women in the township and Guangxi residents reported a shorter history of sex work than their counterparts in other locations ($p < .001$) or from other provinces ($p < .001$).

History of pregnancy and abortion. Sixty-three percent of the women reported having had at least one pregnancy in the past; of these 30% reported one pregnancy, 19% reported two, 8% reported three, and 6% reported more than three. Among those with at least one pregnancy, about three fourths reported having had at least one abortion. While the history of pregnancy was similar across work locations, women in the county seat tended to have a higher rate of abortion (55%) than those in the development zone (48%) or township (36%). Compared to their Guangxi counterparts, non-Guangxi residents had substantially higher rates of pregnancy (83% vs. 53%, $p < .0001$) and abortion (62% vs. 44%, $p < .0001$).

First sexual partners. Forty-five percent of participants reported that their first sexual intercourse was with their boyfriends, 32% with their husband, 16% with clients and 7% with friends or other people. While more women in the county seat had their first sexual intercourse with boyfriends, more women in the development zone and township had first sex with their husbands. More Guangxi residents than their non-Guangxi counterparts had their first sexual intercourse with clients (20% vs. 7%) or boyfriends (56% vs. 25%), while non-Guangxi residents had first sex with their husbands (64% vs. 16%).

Prior occupation. About 40% of the women were peasants before they entered into commercial sex work and an equal number were migrant workers (41%). One tenth had no job before and 5% were school students. Distribution of prior occupation was significantly different across work location ($p < .0001$), with more women in the township being peasants (78%) and more in the county seat being migrant workers (51%). More Guangxi residents were migrant workers (46%) than non-Guangxi residents (29%), while more non-Guangxi residents than Guangxi natives were peasants (46% vs. 39%) or jobless (15% vs. 8%).

Secrecy of their work. The majority of the sample (89%) had kept the nature of their commercial sex work secret from family members. Only 5% thought their parents knew about it; 8% thought their sibling knew about it and less than 1% thought their boyfriend or fiancée knew about it. Among those who were married, only five (3%) thought husbands knew. Such patterns were similar across work location and province of residency, except that women who thought their husbands knew about their sex work were all Guangxi residents.

Table 2. Sexual experience and history of sex work

		Work Location			Residence Status	
	Overall	City	Zone	Town	Guangxi	Non-Guangxi
Age of sexual onset	18.62 ± 2.11	18.73 ± 2.20	18.47 ± 2.09	18.54 ± 1.87	18.10 ± 1.90	19.64 ± 2.14****
Time being a sex worker (months)	12.18 ± 12.16	12.39 ± 11.78	14.35 ± 14.30	8.06 ± 7.94***	10.88 ± 11.62	14.86 ± 12.92***
At least 1 pregnancy	286 (63%)	160 (60%)	83 (64%)	43 (54%)	159 (53%)	125 (83%)
At least 1 abortion	218 (50%)	132 (55%)	57 (48%)	29 (36%)*	127 (44%)	89 (62%)
Partner of First Sex						
Client	71 (16%)	37 (15%)	22 (17%)	12 (16%)**	60 (20%)	11 (7%)****
Boyfriend	205 (45%)	132 (54%)	45 (35%)	28 (35%)	165 (50%)	37 (25%)
Husband[a]	144 (32%)	59 (24%)	52 (40%)	33 (41%)	47 (16%)	96 (64%)
Friend	24 (5%)	13 (5%)	6 (5%)	5 (6%)	21 (7%)	3 (2%)
Other	8 (2%)	2 (1%)	4 (3%)	2 (3%)	4 (1%)	4 (3%)
Prior Occupation						
Student	22 (5%)	8 (3%)	12 (9%)	2 (3%)****	16 (5%)	6 (4%)***
Peasant	186 (41%)	73 (30%)	51 (39%)	62 (78%)	115 (39%)	70 (46%)
Migrant worker	183 (41%)	122 (51%)	49 (38%)	12 (15%)	136 (46%)	44 (29%)
No job	46 (10%)	30 (12%)	13 (10%)	3 (4%)	23 (8%)	23 (15%)
Other	14 (3%)	8 (3%)	5 (4%)	1 (1%)	6 (2%)	8 (5%)
Family Member Who Knows You Are a Sex Worker						
Nobody	402 (89%)	214 (88%)	12 (92%)	67 (84%)	264 (88%)	135 (89%)
Parents	21 (5%)	8 (3%)	6 (5%)	7 (9%)	18 (6%)	3 (2%)
Sibling	35 (8%)	21 (9%)	6 (5%)	8 (10%)	20 (7%)	14 (9%)
Boyfriend or fiancée	5 (1%)	5 (2%)	0	0	5 (2%)	0 (0%)
Husband[a]	5 (3%)	2 (3%)	2 (3%)	1 (3%)	5 (7%)	0 (0%)**
Reasons for Being a Sex Worker						
Quick/easy money	24 (5%)	13 (5%)	7 (5%)	4 (5%)	22 (7%)	2 (1%)**
Easy/pleasant job	27 (6%)	6 (3%)	14 (11%)	7 (9%)**	19 (6%)	8 (5%)
No better job	185 (41%)	77 (32%)	68 (52%)	40 (50%)****	117 (39%)	64 (42%)
Influenced by others	67 (15%)	21 (9%)	25 (19%)	21 (26%)****	44 (15%)	22 (15%)
Marriage failure	37 (8%)	22 (9%)	13 (10%)	2 (3%)	21 (7%)	16 (11%)
Revenge on men	10 (2%)	4 (2%)	5 (4%)	1 (1%)	7 (2%)	2 (1%)
Deceived/forced	24 (5%)	17 (7%)	7 (5%)	0	18 (6%)	6 (4%)

Table 2. Continued

Family financial difficulty	295 (65%)	162 (67%)	74 (57%)	59 (74%)*	197 (66%)	97 (65%)
Other	13 (3%)	7 (3%)	3 (2%)	3 (4%)	11(4%)	2 (1%)

[a] Percentages were based on the numbers of female sex workers who were married.
* $p < .05$. ** $p < .01$. *** $p < .001$. **** $p < .0001$.

Reasons for engaging in commercial sex. Most women selected family financial hardship as a major reason to engage in commercial sex (65%). This percentage was consistent between Guangxi and non-Guangxi residents (66% vs. 65%). While it remained the most-selected reason across all three work locations, more women in the township (74%) than in the county seat (67%) and development zone (57%) selected this reason ($p < .05$). The other top reasons included inability to find a better job (41%) and influence of their friends or fellow villagers (15%). More women in the development zone (52%) and township (50%) than in the county seat (32%) thought the inability to find a better job was one of the reasons they engaged in commercial sex. Likewise, more women in the township (26%) than in the development zone (19%) or county seat (9%) said that they were influenced by their friends or fellow villagers.

Contextual Factors of Their Working

Size of workplace. As shown in Table 3, there were about 16.39 ($SD = 9.77$) female sex workers in each workplace, with an average of 15.43 ($SD = 7.96$) in the county seat, 20.65 in the development zone and 12.56 ($SD = 4.99$) in the township ($p < .0001$). The mode of number of female sex workers was 2–5 for the county seat (26%), 21–50 for the development zone (43%) and 11–15 for the township (38%, $p < .0001$). The number of female sex workers in the workplace did not differ between the Guangxi and non-Guangxi residents.

Income. Overall, average monthly income was 576 Yuan (about 70 US dollars), with 696 Yuan (85 US dollars) for women in the county seat, 419 (approximately 50 US dollars) in the development zone, and 468 (55 US dollars) in the township ($p < .0001$). About one half of the women made no more than 400 Yuan (50 US dollars) monthly, while only 2% of the women made between 2,000 to 4,000 Yuan (250 to 500 US dollars).

Frequency of changing workplace. About 15% of the women typically stayed in any workplace for less than 3 months, 10% stayed from 3 to 6 months, 27% stayed from 6 to 12 months and 48% stayed longer than 1 year. About one half of the women (52%) in the county seat or development zone stayed in one workplace longer than 12 months, while only 29% of women in the township stayed in one place for more than 12 months ($p < .0001$). Compared with Guangxi residents, more non-Guangxi residents stayed in one workplace for more than 12 months (59% vs. 43%, $p < .0001$).

Money Management. In terms of money management, about one quarter of the women said they sent most of their income to their parents; 42% saved the money for themselves; 28% spent most of the money. Only about 5% said they gave most to their husband or boyfriend. More women in the county seat (29%) or the township (26%) than in the development zone (16%) gave most of their money to their parents, while more women in the development zone (50%) saved money for themselves than women in the county seat (41%) or township (31%). Money management practices differed significantly between Guangxi and non-Guangxi residents, with more residents giving money to their parents (33% vs. 9%) and more non-residents saving the money for themselves (62% vs. 32%, $p < .0001$).

Experience with the law. Only a small proportion of women had experienced any problem with the law or law enforcement agencies because of involvement in commercial sex: 4% ($n = 19$) had been arrested, 3% ($n = 12$) fined, and less than 1% ($n = 3$) sent to women's education centres. While the numbers are not sufficient to examine differences across work locations and provinces of

residency, it is interesting to note that all 3 women sent to women's education centres were working in the county seat and all were Guangxi natives.

Table 3. Working environment

		Work Location			Residence Status	
	Overall	**City**	**Zone**	**Town**	**Guangxi**	**Non-Guangxi**
# of sex workers in your place	16.39 ± 9.77	15.43 ± 10.99	20.65 ± 7.96	12.56 ± 4.99****	16.09 ± 9.37	16.91 ± 0.42
Median monthly income (Yuan)	400	500	400	375		
How Often Do You Change Workplace						
<3 m	68 (15%)	40 (17%)	16 (12%)	12 (15%)****	54 (18%)	14 (9%)**
3–6 m	46 (10%)	27 (11%)	12 (9%)	7 (9%)	33 (11%)	12 (8%)
6–12 m	121 (27%)	49 (20%)	34 (26%)	38 (48%)	84 (28%)	35 (23%)
>12 m	126 (28%)	63 (26%)	46 (35%)	17 (21%)	69 (23%)	56 (37%)
Never	91 (20%)	63 (26%)	22 (17%)	6 (8%)	58 (20%)	33 (22%)
Money Management						
Parents	112 (25%)	70 (29%)	21 (16%)	21 (26%)*	97 (33%)	13 (9%)****
Husband or boyfriend	12 (5%)	5 (2%)	3 (2%)	4 (5%)	9 (3%)	3 (2%)
Self	189 (42%)	99 (41%)	65 (50%)	25 (31%)	96 (32%)	93 (62%)
Spent most	125 (28%)	64 (26%)	37 (28%)	24 (30%)	90 (30%)	33 (22%)
Other	15 (3%)	4 (2%)	5 (4%)	6 (8%)	6 (2%)	9 (6%)
Experience with Law						
Was arrested	19 (4%)	11 (5%)	6 (5%)	2 (3%)	16 (5%)	3 (2%)
Was fined	12 (3%)	8 (3%)	3 (2%)	1 (1%)	7 (2%)	5 (3%)
Was incarcerated	3 (1%)	3 (1%)	0	0	3 (1%)	0
Who Are Most of Your clients						
Businessmen from other places	120 (26%)	88 (36%)	19 (15%)	13 (16%)****	88 (29%)	32 (21%)
Migrant workers in H County	66 (15%)	43 (18%)	15 (12%)	8 (10%)	51 (17%)	14 (9%)*
Local peasants	99 (22%)	35 (14%)	37 (28%)	27 (34%)****	74 (25%)	25 (17%)*
Local urban residents	277 (61%)	138 (57%)	85 (65%)	54 (68%)	176 (59%)	98 (65%)
Other	54 (11%)	37 (15%)	10 (8%)	4 (5%)*	33 (11%)	18 (12%)

*$p < .05$. **$p < .01$. ***$p < .001$. ****$p < .0001$.

Identity of clients. Most women (61%) identified local urban residents as their primary clients, followed by businessmen from other places (26%), local peasants (22%) and migrant workers in H

County (15%). Local urban residents were the primary clients for both Guangxi and non-Guangxi women and for women in various work locations. However, more women in the county seat (36%) than women in the development zone (15%) or township (16%) provided services to businessmen from other places ($p < .0001$). In contrast, more women in the township (34%) or development zone (28%) than women in the county seat (14%) provided services to local peasants ($p < .0001$). More Guangxi women than non-Guangxi women provided services to migrant workers (17% vs. 9%) and local peasants (25% vs. 17%, $p < .05$).

Sexual Behaviours and HIV-Related Risk

Stable partnership. As shown in Table 4, on average the sample had 1.29 stable sexual partners (husband, fiancé, boyfriend, lover or long-term client) and the number of stable sexual partners was similar across work locations. About 8% of participants reported a sexual relationship with a "sugar-daddy" (a rich man) in the previous 6 months, with more women reporting this in the county seat (11%) than in the development zone (3%) or township (5%) ($p < .05$). The rates of having a sugar daddy were similar by province of residency (Guangxi vs. non-Guangxi).

Number of clients. The women reported an average of 2 clients ($SD = 1.75$) per week (range of .25 to 14 clients), with 2.40 clients ($SD = 2.18$) among women in the county seat, 1.41 ($SD = .78$) in the development zone and 1.65 ($SD = .73$) in the township. About one half of the women had 1 client per week and about one fifth had 3 or more clients per week. Guangxi natives reported more clients per week than non-Guangxi residents (2.13 vs. 1.73, $p < .05$). The maximum number of clients per day averaged 1.25 ($SD = .60$) for the entire sample (range of 1 to 5). While the number was similar between Guangxi and non-Guangxi residents, women in the county seat reported a higher number of clients (1.34) than those in the development zone (1.08) or township (1.20).

Sexual coercion. About 15% of the sample reported being raped or forced to have sex during the previous 6 months, with more women in the county seat (20%) than those in the development zone (13%) or township (5%) reporting such experiences ($p < .01$). Rates of being raped or forced to have sex were similar by province of residency (Guangxi vs. non-Guangxi).

Sex acts. Only a small proportion of women had performed group sex with their clients (4%), with more women in the county seat (7%) than in the development zone (2%) or the township (0%) doing so. Similarly, only about 2% reported oral sex or anal sex with their clients. More Guangxi than non-Guangxi residents reported group sex, oral sex or anal sex, although none of the differences reached statistical significance.

Protective measures with clients. Male condom use and douching after intercourse were the protective measures that two thirds of the women used with their clients during the previous month, followed by oral contraception pills (14%), intrauterine devices (IUD) (13%), withdrawal (12%) and rhythm method (11%). While male condom use and douching were the two most common preventive measures among women across work locations, more women in the county seat (78%) than in the development zone (45%) or township (55%) reported any use of condoms ($p < .0001$). While more women in the county seat (14%) than those in the development zone (9%) or township (4%) used the rhythm method ($p < .05$), more women in the development zone (23%) than in the county seat (8%) or township (13%) used an IUD ($p < .0001$). More women from Guangxi than those from other provinces used oral contraceptives (16% vs. 9%, $p < .05$), condoms (69% vs. 56%, $p < .05$), douching (68% vs. 58%, $p < .05$) or the rhythm method (14% vs. 3%, $p < .0001$). In contrast, more non-Guangxi than Guangxi women used an IUD (29% vs. 5%, $p < .0001$).

Protective measures with stable partners. Among those women who had stable partners ($n = 309$), douching remained the most-used preventive measure (62%) with their stable partners, followed by female condom (42%), oral contraceptives (17%), withdrawal (16%) and the rhythm method (16%). More women in the township (82%) than in the county seat (56%) or development zone (65%) used douching with their stable partners ($p < .01$), while more women in the county seat (20%) than in the development zone (14%) or township (4%) used the rhythm method with their stable partners ($p < .05$). More Guangxi women with stable partners than their non-Guangxi

Table 4. Sexual behaviors of Chinese female sex workers

		Work Location			Residence Status	
	Overall	City	Zone	Town	Guangxi	Non-Guangxi
# of stable partners	1.29 ± .58	1.31 ± .59	1.30 ± .64	1.16 ± .42	1.33 ± .65	1.22 ± .47
Had a sugar-daddy in last 6 months	34 (8%)	26 (11%)	4 (3%)	4 (5%)*	26 (9%)	7 (5%)
Average # of clients per week	2.00 ± 1.75	2.40 ± 2.18	1.41 ± .78	1.65 ± .73****	2.13 ± 1.78	1.79 ± 1.67*
Maximum clients per day	1.25 ± .60	1.34 ± .72	1.08 ± .27	1.20 ± .54****	1.28 ± .64	1.17 ± .52
Being raped in last 6 months	70 (15%)	49 (20%)	17 (13%)	4 (5%)**	49 (16%)	20 (30%)
Sex Acts						
Double	12 (3%)	11 (5%)	1 (1%)	0*	9 (3%)	3 (2%)
Group	6 (1%)	5 (2%)	1 (1%)	0	4 (1%)	1 (1%)
Oral Sex	9 (2%)	6 (3%)	2 (2%)	1 (1%)	8 (3%)	1 (1%)
Anal sex	9 (2%)	6 (3%)	3 (2%)	0	7 (2%)	2 (1%)
Protective Measure with Clients Last Month						
Pills	62 (14%)	36 (15%)	17 (13%)	9 (11%)	48 (16%)	14 (9%)*
Condom	292 (65%)	190 (78%)	58 (45%)	44 (55%)****	204 (69%)	85 (56%)*
Douching	293 (65%)	152 (63%)	87 (67%)	54 (68%)	203 (68%)	88 (58%)*
Withdrawal	54 (12%)	22 (9%)	19 (15%)	13 (16%)	41 (14%)	13 (9%)
Rhythm method	48 (11%)	34 (14%)	11 (9%)	3 (4%)*	43 (14%)	5 (3%)****
IUD	59 (13%)	19 (8%)	30 (23%)	10 (13%)****	16 (5%)	43 ((29%)****
Nothing	24 (5%)	7 (3%)	10 (8%)	7 (9%)*	38 (20%)	13 (11%)*
Mean income (100 Yuan)	5.76 ± 5.23	6.96 ± 6.45	4.19 ± 2.39	4.68 ± 3.23****	6.08 ± 5.68	5.11 ± 4.19
Protective Measure with Partner						
Pills	51 (17%)	33 (19%)	16 (17%)	2 (4%)	38 (20%)	13 (11%)*
Condom	128 (42%)	80 (47%)	34 (37%)	14 (31%)	80 (43%)	46 (39%)
Douching	191 (62%)	95 (56%)	60 (65%)	36 (80%)**	120 (64%)	71 (60%)
Withdrawal	50 (16%)	27 (16%)	14 (15%)	9 (20%)	35 (19%)	15 (13%)
Rhythm Method	49 (16%)	34 (20%)	13 (14%)	2 (4%)*	41 (22%)	8 (7%)****
IUD	59 (19%)	26 (15%)	24 (26%)	9 (20%)	15 (8%)	44 (37%)****
Other Sexual Risks						
Exchanged sex for drugs	2 (<.5%)	2 (1%)	0	0	2 (1%)	0
Sex with alcohol	133 (29%)	71 (29%)	41 (32%)	21 (26%)	96 (32%)	34 (23%)8
Sex during menstruation	30 (7%)	19 (8%)	7 (6%)	4 (5%)	24 (8%)	6 (4%)
Ever had an STD	88 (19%)	55 (23%)	26 (20%)	7 (9%)*	61 (20%)	25 (17%)

*$p < .05$. **$p < .01$. ***$p < .001$. ****$p < .0001$.

counterparts used pills (20% vs. 11%, $p < .05$) or the rhythm method (22% vs. 7%, $p < .0001$).

Other sexual risks. Two women reported exchanging sex for drugs. Both were working in the county seat and were Guangxi residents. About 29% of women reported having had sex under the influence of alcohol. The percentage was similar across work locations, with more Guangxi residents doing so than non-Guangxi residents (32% vs. 23%, $p < .05$). About 7% of women reported having sex with clients during menstruation. The percentage was similar across work locations and between Guangxi and non-Guangxi residents. About one fifth of the sample reported a history of STDs; this was higher among women in the county seat (23%) and the development zone (20%) than in the township (7%).

Substance Use/Abuse and Mental Health Indicators

Substance use/abuse. As shown in Table 5, 15% of the women had been daily smokers during the previous month, and the rate of daily smoking was similar across work locations. One third reported being intoxicated with alcohol at least once during the previous month. More women in the county seat (36%) and development zone (39%) than in the township (14%) reported such an experience ($p < .0001$). Both daily smoking and alcohol intoxication were higher among Guangxi than non-Guangxi women (18% vs. 11%, $p < .05$ for daily smoking; 37% vs. 24%, $p < .01$ for intoxication). Two percent had used illicit drugs and 1% had used intravenous drugs during the previous 6 months.

Life/work satisfaction. Only a small proportion of the women were satisfied with their work (4%) or their life (8%). Guangxi women tended to be more satisfied with their life or work than non-Guangxi women, and women in the township tended to be more satisfied than other women. However, none of the differences reached statistical significance.

Suicidal thoughts and suicidal attempts. About 14% of the women reported thoughts about suicide during the previous 6 months, and the rate was similar between Guangxi and non-Guangxi women. About 8% of the sample had actually attempted suicide during the previous 6 months, with more Guangxi (10%) than non-Guangxi women (6%) having made such attempts. More women in the county seat tended to have suicidal thoughts and suicide attempts than other women, although the difference was only significant for suicide attempts ($p < .05$).

Psychological worries. The top five issues the women worried about most during their daily life were STD infection (75%), HIV infection (58%), family awareness of the nature of their work (56%), getting pregnant (44%) and being arrested by the police (37%). In general, more women in the county seat worried about these issues than other women, particularly about HIV infection ($p < .0001$), family awareness of their work ($p < .05$) and being arrested. ($p < .01$). In addition, more women in the county seat (18%) and the development zone (13%) than in the township (4%) worried about being raped and robbed ($p < .01$). There was no statistically significant difference between Guangxi women and non-Guangxi women on issues of worry, except that more Guangxi (53%) than non-Guangxi women worried about getting pregnant ($p < .0001$).

Attitudes toward sex work. The majority of the women (81%) thought that they would not be sex workers if they had other choices. About one fourth viewed sex work as just another job. More than one third believed that once they had been a sex worker, it would be very difficult for them to do something else. About one fifth agreed that being a sex worker for 1 day is the same as being a sex worker all the time. Such views and attitudes were similar across work locations and between Guangxi and non-Guangxi residents, except that more Guangxi women (41%) than non-Guangxi women (29%) believed it would be very difficult for them to do something else in the future ($p < .01$).

Future personal plans. About 62% of participants said they currently had no plans at all regarding their future. About 30% would like to find another type of job immediately, with about 8% planning to continue in this line of work for a few more years. This pattern of response was consistent across work locations and province of residency.

Regarding long-term plans, nearly one half of the women would like their own business in the future. More women in the county seat (53%) and development zone (48%) than in the township (25%) planned to do so ($p < .05$). Likewise, more non-Guangxi women (53%) than Guangxi

Table 5. Other health behaviors and mental health indicators

		Work Locations			Residence Status	
	Overall	City	Zone	Town	Guangxi	Non-Guangxi
Substance Use/abuse						
Daily smoking last 6 m	70 (15%)	39 (16%)	22 (17%)	9 (11%)	53 (18%)	16 (11%)*
Alcohol intoxication last 6 m	149 (33%)	87 (36%)	51 (39%)	11 (14%)****	111 (37%)	36 (24%)**
Illegal drug use last 6 m	10 (2%)	3 (1%)	6 (5%)	1 (1%)	5 (2%)	5 (3%)
IDU last 6 m	4 (1%)	2 (1%)	2 (2%)	0	3 (1%)	1 (1%)
Mental Health Indicators						
Satisfaction with work	19 (4%)	9 (4%)	6 (5%)	4 (5%)	17 (6%)	2 (1%)
Satisfaction with life	34 (8%)	15 (6%)	11 (8%)	8 (10%)	30 (10%)	4 (3%)
Suicidal thoughts last 6 m	60 (14%)	42 (17%)	16 (12%)	7 (9%)	42 (14%)	23 (15%)
Suicide attempts last 6 m	38 (8%)	29 (12%)	5 (4%)	4 (5%)*	29 (10%)	9 (6%)
Issues Worried Most						
Be known by family as a sex worker	253 (56%)	148 (61%)	72 (55%)	33 (42%)*	163 (55%)	87 (58%)
Abused by clients	121 (27%)	67 (28%)	39 (30%)	15 (19%)	86 (29%)	35 (23%)
Cannot make enough money	89 (20%)	49 (20%)	29 (22%)	11 (14%)	66 (22%)	23 (15%)
Get pregnant	198 (44%)	116 (48%)	50 (38%)	32 (41%)	157 (53%)	40 (27%)****
Be raped and robbed	64 (14%)	44 (18%)	17 (13%)	3 (4%)**	46 (15%)	18 (12%)
Get STD	338 (75%)	188 (77%)	91 (70%)	59 (75%)	226 (76%)	110 (73%)
GET HIV/AIDS	262 (58%)	160 (66%)	69 (53%)	33 (42%)****	173 (58%)	87 (58%)
Be arrested by police	166 (37%)	97 (40%)	53 (41%)	16 (20%)**	117 (39%)	49 (33%)
Attitudes Toward Sex Work (Agree)						
Sex work is the same as other work	119 (26%)	68 (28%)	31 (24%)	20 (25%)	85 (29%)	31 (21%)
I would not be one if I had choice	368 (81%)	200 (82%)	105 (81%)	63 (79%)	241 (81%)	124 (83%)
Difficult to do something else	167 (37%)	87 (36%)	50 (39%)	30 (38%)	123 (41%)	43 (29%)**
One day is the same as all the time	86 (19%)	48 (20%)	18 (14%)	20 (25%)	59 (20%)	27 (18%)
Current Plan ($p = .000$)						
A few more years of sex work	34 (8%)	13 (5%)	9 (7%)	12 (15%)	24 (8%)	10 (7%)
No plan	282 (62%)	148 (61%)	73 (56%)	61 (76%)	192 (64%)	87 (58%)
Change job immediately	136 (30%)	81 (34%)	48 (37%)	7 (9%)	82 (28%)	53 (35%)
Future Plans						
Have my own business	209 (46%)	127 (53%)	62 (48%)	20 (25%)*	128 (43%)	80 (53%)*
Get married or have child	278 (62%)	158 (66%)	70 (56%)	50 (63%)	207 (70%)	68 (46%)****

Table 5. Continued

Unmarried	216 (80%)	122 (76%)	52 (81%)	42 (93%)*	182 (81%)	31 (74%)
Married	60 (34%)	35 (44%)	17 (28%)	8 (23%)*	23 (33%)	37 (35%)

*$p < .05$. **$p < .01$. ***$p < .001$. ****$p < .0001$.

women (43%) planned to own a business in the future ($p < .05$). Among those who were unmarried, about 80% would like to get married and have children. Among married women, one third would like to have (more) children in the future. More unmarried women in the township (93%) than in the county seat (76%) or development zone (81%) wanted to get married ($p < .05$), while more married women in the county seat (44%) than in the development zone (28%) or township (23%) wanted to have children ($p < .05$).

Discussion

This descriptive study provides data on individual profiles of women providing sexual services in a multi-ethnic area in China. The profiles were examined for differences across work locations and between Guangxi residents (in-province residents) and those who migrated to Guangxi from other provinces (out-of-province residents). Work location was employed in the current study to represent local economic conditions, as the township represents a less economically developed rural setting and the county seat is the political, economic and cultural centre of the county. Data in the current study suggest a strong association between the individual profiles of female sex workers with the economic conditions of work sites and residence status (in-province residency vs. out-of-province residency).

The sample of female sex workers in this study is different in a number of key demographic characteristics and sexual practices from those of female sex workers in studies conducted in other economically advantaged regions of China. First, this sample was multi-ethnic, with a mixture of Han majority (55%), Zhuang minority (32%) and other minorities (14%). Most previous studies in other regions of China were conducted among women of predominately Han majority, ranging from 92.8% (Rogers et al. 2002) to 96.7% (Lau et al. 2002). Second, women in the current study were less educated, with more than 50% of women having finished no more than 6 years of formal schooling (or elementary school), compared with 13% in Beijing (Rogers et al. 2002) and 32% in Guangzhou (Lau 2002).

The difference in ethnicity and education across different work locations in the current study also followed the same trend of studies in Guangxi and other economically advantaged provinces/regions, with more women of Han ethnicity and with relatively better education tending to work in locations with better economic conditions. These differences between female sex workers in the current study and those in studies conducted in major metropolitan areas (e.g., Beijing) or economically booming provinces or regions (e.g., Guangdong, Shenzhen and Hainan) provide further support to the association of local economic conditions with demographic characteristics and their HIV-related risks among female sex workers.

Third, the sample in the current study had fewer numbers of clients than those of female sex workers in other economically booming regions. Fourth, women in the current study reported lower income (80% earned ≤75 US dollars per month) than female sex workers in other regions (Rogers et al. 2002; van den Hoek et al. 2001) and other bigger cities in Guangxi (Qu et al. 2002). Fifth, most women in the current study were Guangxi natives (66%), while in studies conducted in other regions of China, most female sex workers were young out-of-province migrants.

Despite their young age, short personal history of sex work and relatively low number of clients, the sample of female sex workers in the current study faces a significant risk of HIV/STD infection and transmission. The self-reported history of STD infection was similar to that in more economically advantaged regions such as Shenzhen (15%, Lau et al. 2002). The proportion of women who had never used a condom with their clients during the previous month was similar to that reported

in other studies (Yang et al. 2005a). Similarly, condom use with stable partners was low among this population. In addition, most women in the current study reported concurrent multiple sexual partners in a mixture of commercial and non-commercial partners.

Researchers in both China and international communities have been concerned about the "bridging effect" of female sex workers in the rapid spread of HIV from a high-risk population (e.g., intravenous drug users [IDU]) to the general population in China (Yang et al. 2005a). One aspect of the bridging effect is the mixture of commercial sex and illicit drug use among female sex workers. However, rates of illicit drug use, particularly the rate of IDU, was low among this population. Although drug use was locally prevalent in Guangxi (Hammett et al. 2003), very few women reported exchanging sex for drugs. One of the reasons for this low rate of drug use among female sex workers may be because they were relatively new to sex work. In addition, a small number of women in the current study reported having anal sex. This finding is consistent with previous studies in which the rate of anal sex among Chinese female sex workers was about 1% (van den Hoek et al. 2001; Qu et al. 2002). The low rates of illicit drug use (including IDU) and other high-risk sexual behaviour (e.g., anal sex) among female sex workers present a window of opportunity for early prevention efforts among this population.

There are potential limitations in the current study. First, the sample was recruited through convenience sampling rather than random sampling. Because commercial sex is technically illegal in China, a random sampling is not feasible. Therefore, caution is needed in generalizing the findings from this study to other female sex worker populations. However, the fact that our sample is comparable to other Guangxi-based studies (e.g., Qu et al. 2002) in a number of key demographic characteristics (e.g., age, ethnicity, education and residence status) provides evidence of the representative nature of our sample. Second, the current sample is multi-ethnic, and while the proportion of ethnic minorities mirrored the ethnic composition of the Guangxi population, the sample limited the ability of these findings to be generalized to other regions where other ethnic groups (e.g., Han) predominate in the population. Third, because the current study was not designed to examine the personal profile of female sex workers, some important information (e.g., family socioeconomic status) was not collected due to space limitations of the survey instrument.

The findings in the current study have some important public health implications. First, there is an urgent need for effective prevention and intervention programs targeting this new but rapidly growing female sex worker population, particularly in remote, rural areas. Given the relatively low education, low income and young age of this population, empowerment and alternative employment/education opportunities should be part of the intervention efforts. Similarly, mental health promotion is needed among this population to increase their adaptive coping strategies with their stressful lives. Second, the associations between local socioeconomic conditions and HIV risk behaviours among female sex workers suggest that HIV/STD intervention efforts among female sex workers must be appropriate for (and responsive to) local cultural and economic conditions and must take the social and cultural contextual factors of their working environment (and sexual risks) into consideration.

Global literature indicates that HIV prevention should go beyond the individual level and incorporate environmental and structural factors (Latkin and Knowlton, 2005; Logan et al. 2002; Morisky et al. 2005; Parker et al. 2000). Our study, as the first step toward a better understanding of these environmental and structural factors, suggests the need for multi-faceted strategies targeting groups of sex workers based on their differing individual characteristics, including demographic background, sexual practices and work conditions. Future studies with rigorous research methodology are needed to focus on environmental factors (e.g., partners, gatekeepers, workplace, community and culture) and structural factors (e.g., policy, healthcare system, law enforcement and legislature) associated with female sex workers' HIV risks. Furthermore, these studies should explore or evaluate ways to utilize these factors in designing and implementing effective and culturally appropriate HIV/STD interventions among female sex workers. Intervention programs may be more effective if efforts at multiple levels (e.g., individual, family, community, environmental and structural) can be imple-

mented synergistically across multiple contexts of risk factors (Pequegnat and Stover 2000; Morisky et al. 2006).

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Strengthening Health Development at the Community Level in Thailand: What Events Should Be Managed?

Vasuton Tanvatanakul, Instituto de Ciências Biomédicas Abel Salazar (ICBAS), University of Porto, 4099–033 Porto, Portugal and Faculty of Public Health, Burapha University, Chonburi, 20131, Thailand

Corália Vicente, Instituto de Ciências Biomédicas Abel Salazar (ICBAS), University of Porto, 4099–033 Porto, Portugal

João Amado, Instituto de Ciências Biomédicas Abel Salazar (ICBAS), University of Porto, 4099–033 Porto, Portugal

Sastri Saowakontha, Faculty of Public Health, Burapha University, Chonburi, 20131, Thailand

Correspondence: Vasuton Tanvatanakul, Faculty of Public Health, Burapha University, Chonburi, 20131, Thailand, Tel: +66 7138 3845, Tel./Fax: +66 3839 0041, Email: vasuton@buu.ac.th

Abstract

Community action for health development is important for sustaining community health. This study aimed to identify the components and processes for strengthening the community health development process. We used an exploratory, cross-sectional design and focus group discussions in Chonburi, Thailand, between March 2003 and April 2005. We interviewed 422 respondents selected by stratified sampling from various groups involved with community health activities. Interview data was analyzed and then clarified by focus group discussions with representatives of the communities and stakeholders. Results indicated that both study components, namely, community experience in health activities and appearance of health conditions in the community, as well as all of their subcomponents, influence community action for health development. The most influential subcomponent

of the community experience in health activities was perception of health information and policy ($p < .001$; $r = .546$). The most influential subcomponent of the appearance of health conditions in the community was the impact of health information ($p < .001$; $r = .439$). Focus group discussions indicated the communities' potential, ideas and need to activate health development by community mobilization. We recommend that the government encourage and support community action for health development with the subcomponents identified by this study. The process of community empowerment and network of implementation should encourage successful and sustainable health development by the community.

Introduction

Health development is the process of continuous, progressive improvement of the health status of individuals and groups in a population (WHO 1998). There are many health development patterns: community based, government based, partnership based, etc. Each pattern is suited to different health activities (Bureau of Policy and Strategy [BPS] 2003).

In many countries, governments have acted to strengthen health development. However, increasing technological complexity and introducing relative sophistication and centralization in national health systems decrease community involvement (Haile and Peter 1999). In most cases, the government has limited resources, limited health service distribution systems and limited know-how about community contexts. Meanwhile, communities have some potential to organize their own public service processes. Therefore, community members should partner with national governments or perhaps take the lead for health development in their communities (WHO 1994, 2003; WHO Regional Office for Europe 2001; WHO Regional Office for the Eastern Mediterranean [ROEM] 2004).

Community health development is a subset of community development that is useful in helping a community to employ and increase their capacity to improve local health status. The approach is characterized as a "people process" because it nurtures and provides a forum for developing initiatives through interactive and collaborative strategies (Burdine 2003; Green and Ottoson 1999).

Community involvement in health development programming grew in importance, beginning with the Declaration of Alma-Ata in 1978, to achieve the target of "Health for All by the Year 2000" using a strategy of primary healthcare (WHO 1979). An important element of this strategy was promoting greater and more effective community participation in services and structures designed to bring better healthcare to the people (Haile and Peter 1999). Since then, there have been various studies of community involvement models. The results of health development by community involvement have demonstrated significant progress in health promotion and prevention activities, reduced poverty levels and improved quality-of-life indices (WHO ROEM 2004; Wibulpolprasert 2005).

Health development by the community requires inter-sectoral and intra-sectoral collaboration in the community, community mobilization, community empowerment and training community leaders in various groups (Fawcett et al. 1995; Li-Chun et al. 2004; Tareen and Abu Omar1998; Yimyam, N. 2003). However, there is a need to increase the knowledge, skills, education and resources allocated (Bishai et al. 2002; Geiger 2002). Good management at every administration level and encouragement from policy makers and politicians are needed (Bhuyan 2004; WHO ROEM 2004). Other important points are the practices of specific target groups, structure of networks and continuous activities (Chaoniyom et al. 2005).

Activities promoting health development by the community need community-based implementation. If people within communities are unconcerned, misunderstood or inactive, it is very difficult to improve healthy activities in those communities (American Public Health Association [APHA]1983; BPS 2003). Therefore, promoting or motivating people in the community to become community-based decision-makers involved in community health development is important. The objective of this study was to examine the components and processes that could both motivate the strengthening of community health development and manage health development in communities.

Materials and Methods

Design and Study Area

Our study employed an exploratory cross-sectional design, using a survey and focus group discussions. The study was approved by the Institutional Review Board from Instituto de Ciências Biomédicas Abel Salazar (ICBAS) of the University of Porto and was reviewed and approved by the Burapha University Ethics Committee. The research was conducted in the rapidly developing communities of Chonburi province, Thailand. Chonburi province is located in the industrial development region of Thailand on the eastern coast of the Gulf of Thailand, approximately an hour's drive to the southeast of the capital, Bangkok. Chonburi province includes the tourist city of Pattaya, as well as an international seaport and many industrial estates and various forms of agriculture. Rapid development has led to increased migration, creation of different socio-economic groups, a constantly evolving multicultural heritage and a congested living environment.

Study Population

Five communities located in 5 of the 10 different districts of Chonburi province were included. We consulted experts in various professions to find the communities that best represented the population of interest – the various groups of community members and stakeholders who were involved with community health activities. The five communities' population is estimated at 42,340 people. We estimated the minimum sample size as 398 people. To ensure a representative data set, we gave 500 surveys to interviewers trained from the research team. For the survey, we used stratified sampling to select representatives from community leaders, local and government personnel in communities, village health volunteers, chairs and members of various assemblies and villagers in each village. In each community, we arranged a focus group with a representative from each of those groups of interest.

Instruments

The interview questionnaire was created and developed by reviewing related literature. The researchers then wrote, analyzed and evaluated the questions and consulted with experts in community-based initiatives, community health development, health promotion and health prevention, questionnaire construction and research methodology. Questions were pre-tested in different communities with similar backgrounds to those of the study communities. Revisions were made prior to data collection by means of interview survey in study communities.

The questionnaire (included in Appendix)consisted of four main parts and seven subparts that measured related constructs. The reliability of the interview survey questionnaire, Cronbach's alpha, was 0.87. Part I asked for demographic data. Part II asked about community experience in health activities. The Cronbach's alpha was 0.79. Within Part II, we asked about four constructs: (1) health and quality-of-life practices, with questions such as "Were the programs of health and community health different in the past?" (2) perception of health situation changes, with questions such as "How quickly does the health situation change in your community?" and "Are there pollutants which may be dangerous to the health in your community?" (3) involvement in health resource allocation, as measured with questions such as "Are there private health services?" and "Have you or a member of your family ever used folk health wisdom as a treatment?" and (4) perception of health information and policy as measured with questions such as "How is your degree of satisfaction with the government health implementation policy?" and "Have you received health information from the mass media?" Part III asked about appearance of health conditions in the community. The Cronbach's alpha was 0.75. These constructs had emerged: (1) health awareness, as measured by questions such as "How often do you normally exercise?" (2) impact of health information, which was the response to questions such as "Does news of a new health problem or new communicable disease interest you?" and (3) health development concerns, which were measured by asking if the person had an

interest in health and community health activities or had ideas about preventing health problems. Each construct in Parts II and III was measured using scale scores from 5 to 11 items. Part IV was about community action for health development. The Cronbach's alpha was 0.85. This part was scored by counting community health-related activities that respondents had knowledge of and practice with health development processes in the community. They consisted of eight items such as "community cooperation, community groups or organization network, perception of community organization and community planning."

Semi-structured interview guidelines for focus group discussions were created and developed after the interview survey.

Data Collection and Analysis

Research team members obtained a signed consent form (included in Appendix) from respondents who agreed to participate in this study, and all respondents were advised of their right to withdraw from the study at any time without prejudice. Four hundred and twenty-two respondents were included in the study. The survey interview and observation were carried out in the home of each respondent from March through September, 2003. Interview data were analyzed and followed up in focus group discussions to clarify the results and to find out the real situations described by the analysis.

We conducted focus group discussions and observations in communities during August and September 2004 and March and April 2005. Each focus group had between 11 and 16 participants and lasted approximately two to three hours. All groups were audiotaped and videotaped. Observation notes including pictures were added to the actual focus group files. Each tape was transcribed verbatim.

Descriptive statistics (percentages, mean and standard deviation) were used to describe the variables. The Pearson product-moment correlation coefficient was used to determine important factors. Content analysis of the taped focus groups was conducted. Additionally, observation data and pictures were analyzed to verify some information.

Results

Results of Interview Survey

General Information About Respondents

The response rate was 84.4%. Respondents were 20–80 years of age with an average age of 44.4 (*SD* = 11.6). There were slightly more women respondents (54.5%) than men. More than half of respondents had received primary education (52.8%). Over two thirds were married (69.7%). The most common occupations were "small shop in the community," "factory employee," "agriculturalist/farmer" and "government service" (26.3%, 23.9%, 22.7% and 21.6% respectively). Over one fifth (21.1%) indicated insufficient family income. The majority of respondents were local people (62.3%); 37.7% were migrants to the area.

Scores and Correlation of the Study Components and Subcomponents

Study components. The range of possible scores of the community experience in health activities component was from 1 to 81, with an average of 54.97 (*SD* = 8.55). The range of possible scores of appearance of health conditions in the community component was from 4 to 66, with an average of 44.81 (*SD* = 6.74). The range of possible scores of community action for health development was from 0 to 28, with an average of 17.61 (*SD* = 6.14). Average scores of each component were high. The community experience in health activities component and the appearance of health conditions in the community component were influential in the measurement of community action for health development ($p < .001$; $r = .628$ and .490 respectively) (Tables 1 and 2).

Study subcomponents of the community experience in health activities component. The ranges of possible and average scores for the subcomponents of health and quality-of-life practices, percep-

tion of health situation changes, involvement in health resource allocation, and perception of health information and policy were 1–25, 17.60 (*SD* = 3.48); 0–19, 12.91 (*SD* = 2.59); 0–20, 11.16 (*SD* = 2.85); and 0–17, 13.29 (*SD* = 2.32), respectively. Average scores of each subcomponent were high, and all of them – health and quality-of-life practices, perception of health situation changes, involvement in health resource allocation, and perception of health information and policy – were influential in community action for health development ($p < .001$; $r = .483$, .408, .479 and .546, respectively). The perception of health information and policy subcomponent had most influence ($p < .001$; $r = .546$) (Table 1).

Table 1. Correlation of the component "community experience in health activities" and its subcomponents with "community action for health development" (*N* = 422)

Component/Subcomponents	Mean	*SD*	Community Action for Health Development	
			r*	*p*-value**
Community experience in health activities component[a]	**54.97**	**8.55**	**.628**	**< .001**
Health and quality-of-life practices[b]	17.60	3.48	.483	< .001
Perception of health situation changes[c]	12.91	2.59	.408	< .001
Involvement in health resource allocation[d]	11.16	2.85	.479	< .001
Perception of health information and policy[e]	13.29	2.32	.546	< .001

Range of possible scores: [a]1–81. [b]1–25. [c]0–19. [d]0–20. [e]0–17.
*Pearson product-moment correlation coefficient. ***p*-value from Pearson product-moment correlation coefficient.

Study subcomponents of the appearance of health conditions in the community component: The ranges of possible and average scores for the subcomponents of health awareness, impact of health information and health development concerns were 2–23, 14.54 (*SD* = 2.87); 2–17, 13.59 (*SD* = 2.26); and 0–26, 16.64 (*SD* = 3.33), respectively. Average scores of each subcomponent were high level of score, and all of them – health awareness, impact of health information, and health development concerns – were influential in community action for health development ($p < .001$; $r = .324$, .439 and .432, respectively). The subcomponent with most influence was the impact of health information ($p < .001$; $r = .439$) (Table 2).

Results From Focus Group Discussions

General Information for Community Mobilization

Focus group discussions found that Thai communities already have health development programs, which they implement to the extent possible given their resources. However, as in previous research, we found that many of the programs are based on individual interests or commands from government sectors and may be inappropriate for the community, limited in community decision-making, and not sustainable (Tanvatanakul 2004). As an alternative, local organizations and community members need, and have the potential, to organize and implement health development programs in their communities, supported by government sectors (Wibulpolprasert 2005; Yimyam 2003).

The Community Needs to Be Supported by the Government

The summary of focus group results showed there are topics the government should attend to in order to encourage and support communities. Areas for supporting community action for health

development were (1) *providing information and knowledge support* to community members by using various training techniques, strengthening the education system and using public relations, (2) *providing resource support* to communities in terms of personnel, budget, supporting teams and equipment (Bishai et al. 2002; Chaoniyom et al. 2005; Geiger 2002), (3) *improving supervision, evaluation, reporting and health campaign planning* with the community by providing effective analysis, planning and support teams, and 4) *supporting activities that cannot be implemented at the community level*, such as an effective referral system, complicated healthcare, health pilot projects and a health infrastructure organization.

Table 2. Correlation of the component "appearance of health conditions in the community" and its subcomponents with "community action for health development" (*N* = 422)

Component/Subcomponents	Mean	*SD*	Community Action for Health Development	
			r*	*p*-value**
Appearance of health conditions in the community component[a]* **	**44.81**	**6.74**	**.490**	**< .001**
Health awareness[b]	14.54	2.87	.324	< .001
Impact of health information[c]	13.59	2.26	.439	< .001
Health development concerns[d]	16.64	3.33	.432	< .001

Range of possible scores: [a]4–66. [b]2–23. [c]2–17. [d]0–26.
*Pearson product-moment correlation coefficient. ** *p*-value from Pearson product-moment correlation coefficient. *** "Appearance of health conditions in the community" is a composite of various opinions, processes, activities and practices of health development of people in the communities.

Encourage and Support Community Mobilization

The summary of focus group discussions also highlighted topics to encourage and support community mobilization. The first topic is *community empowerment* (Fawcett et al. 1995), in terms of leadership, a community committee, a community learning organization, community meetings, community SWOT analysis and decision-making, setting a vision and a mission for the community, analyzing the community situation and setting the community development plan and activities calendar, and campaigning for and continually arranging health activities (Tareen and Abu Omar 1998). Each organization in a community should be involved, sharing community funds or resources, setting rules by community agreement and involvement, rewarding the best practice in the community and evaluating implementation before new planning activities. There could be five steps, summarized as (1) *community problem identification*, (2) *planning*, (3) *implementation*, (4) *utilization*, and (5) *evaluation* (APHA 1983; Tanvatanakul 2004). A second issue that focus groups talked about was *public relations and networking* in order to promote community activities. Networking is necessary for successful community projects, and for coordinating and sharing health-development experiences.

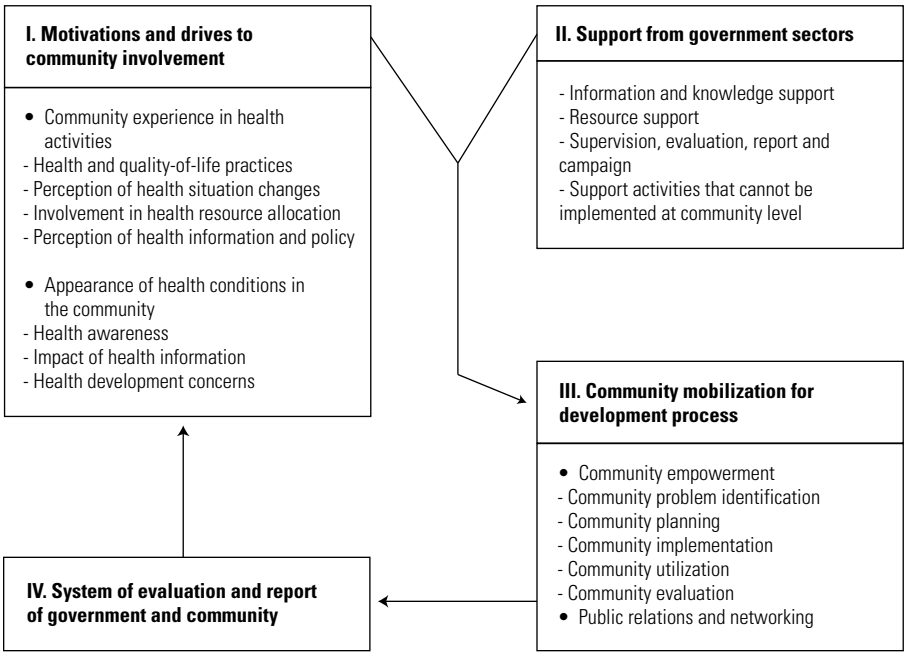
Establish a Process for Health Development by Community Mobilization

The results of this study are shown in a flow chart with four parts that should be implemented, and managed for health development by community mobilization. Figure 1 shows each step of the process, with details of activities for each step.

Figure 1 indicates that the communities should be motivated continually by supporting more community experience in health activities and more appearance of health conditions in communities, especially in the subcomponents identified in this study. Government sectors should support

communities by initiating and negotiating conditions of agreement and encouraging community members to participate. Community empowerment, public relations and networking are important processes in mobilizing the community for development. Thus, communities can organize their own activities via mobilization. Results of community activities should be reported to communities or community networks for use in planning new activities. Evaluation and reporting are necessary for continuous motivation and advancement of activities in communities and are important for government sectors in planning for support of community activities.

Figure 1. Process for strengthening health development by community mobilization



Discussion

Community involvement and action for health development are important in order to increase the effectiveness of health promotion, disease prevention and other health activities in community. However, it was very difficult to motivate community participation or action because the communities are accustomed to the government's health service systems, which are operated to solve the problems for communities (WHO ROEM 2004; Wibulpolprasert 2005). Therefore, motivating community involvement and action for health self-care development needs special mechanisms that are related to community lifestyle and community needs (Green and Ottoson 1999; WHO 1994). Mechanisms should not be enforced from outside the community.

This study indicated that the two main components influencing the community decision to participate in health development were community experience in health activities and an appearance of health conditions in the community. Influential subcomponents included health and quality-of-life practices, perception of health situation changes, involvement in health resource allocation, perception of health information and policy, health awareness, impact of health information and health development concerns. The subcomponents contributing most to the correlation were perception of health information and policy and impact of health information. These two subcomponents were related because they are responses to information and public relations, which are communicated to the people through mass media. However, depending on the culture, ecology and situation in the

community, different approaches to implementing health development programs will be effective (BPS 2003; WHO 1994). The influence of subcomponents on program outcome may differ from place to place, although each subcomponent should always be considered.

Results from focus group discussions indicated that communities had both the potential and need to organize health activities. However, the ability to carry out health programs is related to community resource levels and community empowerment (Chaoniyom et al. 2005). Conditions and processes for organizing health development activities by the communities were the following: suitable for their lifestyle, need to be identified by the community, problem consideration by community, planning and implementation by community, utilization by the community, continuous monitoring and evaluation by community (Tanvatanakul 2004; WHO 1994). The government could act as consultant, continually providing encouragement and supervision for community activities.

Conclusions

Conclusions about health development activities in the community are that the community needs motivation mechanisms continuously, especially for the two main components of community experience in health activities and appearance of health conditions in the community. At the same time, the government should be supportive of the communities. The community should have full authority of health development administration and networks with other sectors for support when a plan is beyond its capacity. Evaluation and reporting should be organized to show and improve the progression of health development in the community.

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In-Kind Drug Donations for Tanzania

Stakeholders' Views – A Questionnaire Survey

Gaby Gehler Mariacher, Swiss Tropical Institute, PO Box, 4002 Basel, Switzerland

Deo Mtasiwa, Dar es Salaam City Council, PO Box 9084, City Hall, Dar es Salaam, Tanzania

Karin Wiedenmayer, Swiss Tropical Institute, PO Box, 4002 Basel, Switzerland

Rudolf Bruppacher, Institute for Clinical Pharmacy, University of Basel, Klingelbergstr. 50, 4056 Basel, Switzerland

Marcel Tanner, Swiss Tropical Institute, PO Box, 4002 Basel, Switzerland

Kurt E. Hersberger, Institute for Clinical Pharmacy, University of Basel, Klingelbergstr. 50, 4056 Basel, Switzerland

Correspondence: Swiss Tropical Institute, PO Box, 4002 Basel, Switzerland;
email: gaby.gehler@unibas.ch

Abstract

Tanzania, a country with low access to essential drugs, receives substantial drug donations (DDs) as in-kind gifts. To support the ongoing health sector reform and to promote a good donation practice, stakeholders' and recipients' views on the appropriateness and acceptability of DDs are of particular interest. The objectives were to collect information on the situation of in-kind DDs in Tanzania, to assess the characteristics of the DD system in Tanzania and to collect stakeholders' and recipients' views on problematic areas in DD processes including all strategies of drug donation. Using a qualitative approach, data were collected through validated postal questionnaires in Swahili and English, which were sent out in June 2001 countrywide to stakeholders of all sectors and levels of decision-making involved in healthcare in Tanzania. Of 1,383 mailed questionnaires, 496 were returned, of which 411 (30%) were eligible for analysis. All respondents perceived in-kind DDs as an important resource to assure drug availability in a context of poverty. Half of the respondents were recipients of in-kind DDs. On average, an estimated 27% of the recipients' drug supply was covered through DDs. The main problem for recipients of all sectors involved in healthcare was the insufficient quantity of DDs for sustainable treatment. Representatives of the public sector asked for more transparency in the DD processes. NGOs and religious facilities with better developed structures raised problems such as shipment fees, insufficient infrastructure and training. Recipients suggested that optimizing communi-

cation would have the greatest impact on improving the DD processes. In Tanzania, DDs were highly accepted by recipients and stakeholders. The primary concern of DD recipients was less the quality of drugs, although quality assurance remained an ongoing concern, than the discrepancy between the recipients' needs and the donors' supply. DDs often failed to cover priority needs. Suggestions of recipients for DD process optimization corresponded fully with the principles of the Tanzanian and the World Health Organization (WHO) guidelines for DDs, with the call for better implementation of the guidelines among donors and recipients.

Background

Drug Donations

Access to essential drugs has a high priority in the health system of all countries. Nevertheless, millions of people worldwide have either limited or no access to such drugs (Pecoul et al 1999; Hozerzeil 2003). In this situation, appropriate drug donations (DDs) can play an important role in bridging drug supply gaps (Reich 2000).

DDs can be either gifts in-kind or cash donations earmarked for drug purchase. In-kind DDs are manufactured drugs imported free into the recipients' country. In development cooperation, different strategies for donating drugs are known (WHO 1999). Drugs can be given directly to the basic healthcare system of the recipient country and made available through private humanitarian institutions (religious, non-governmental and private voluntary organizations), or they can be donated by private companies and individuals. Alternatively, they can be single-source DDs or DDs as part of public/private partnerships (PPPs) with a clearly defined public health goal (Dull et al. 1998; Oladele 1999; Wehrwein 1999; Buse et al. 2000a; Buse et al. 2000b; Shretta et al. 2000; Shretta et al. 2001). Whatever the mode of donation, DDs must comply with the needs and demands of the recipients. Often, however, DDs fail to take account of recipients' needs, existing capacities or the resources of the recipients' country; they do not meet national and international quality standards and their handling wastes human and economic resources (Berckmans et al. 1997; Reich 1999; Autier et al. 2002).

In 1996, the World Health Organization (WHO) issued Interagency Guidelines for Drug Donations (WHO-GDDs) in cooperation with major international agencies active in humanitarian relief. These guidelines, revised in 1999, are intended to serve as an evidence-based tool to be adapted for good donation practice (GDP), as an aid to decision-making, as a reference for national or institutional guidelines and to empower recipients (Table 1) (WHO 1999). The positive impact of these WHO-GDDs on the quality of DDs and DD processes is well documented (Hogerzeil et al. 1997; Oladele 1999; Reich 1999; WHO 2000; Autier et al. 2002).

Within the framework of development cooperation, DDs should be integrated into a country's drug supply system and must be planned as a sustainable support. They have to comply not only with globally valid standards but also with circumstances at the local level, and they must respect the particular needs and interests they serve (WHO 2000b; Junghanss 2001; Weiss et al. 2001).

Table 1. Interagency WHO guidelines for drug donations: principles and applications (WHO 1999)

Core principles	Practical application
• Maximum benefit to the recipient	• Selection of drugs
• Respect for the wishes and authority of the recipient	• Quality assurance and shelf life
• No double standard in drug quality	• Presentation, packing and labelling
• Effective communication between donor and recipient	• Information and management

Peer-reviewed literature on DDs is scarce, and what research there is has usually been carried out in post-emergency situations after disasters and wars (Autier et al. 1990; Berckmans et al. 1997;

Autier et al. 2002) or has focused on DDs for specific diseases (Guilloux et al. 2000) and on corporate DDs in the framework of a program (Shretta et al. 2000; Shretta et al. 2001; Peters et al. 2004). In 1999, Reich provided the first systematic analysis of DDs, examining a range of factors affecting the impact of DDs (Reich 1999). His analysis included preliminary field studies in Armenia, Haiti and Tanzania. The main outcomes of these field studies were (a) DDs were appreciated by all three countries for a variety of reasons, (b) DD processes were perceived as very complex and varied from country to country, (c) problems in organizational relationships had consequences for the recipient of DDs, and (d) WHO-GDDs were perceived as helping to improve DDs.

The Health System in Tanzania

Tanzania is one of the poorest countries in the world and is, as are many countries in the south, a recipient of substantial DDs from abroad. Indicators that are important for the Tanzanian DD system are summarized in Table 2 (MOH 2002; UNDP 2002; CIA 2005). Since 1961, the former English protectorate has been a republic, shifting in 1992 from a one-party socialistic republic to a multiparty government with a free market economy. The people of Tanzania live in a stable society with rare conflict situations, but poverty remains a major challenge. Despite ongoing reforms and improvements such as better access to safe drinking water, a higher adult literacy rate and a decreasing poverty line (SEAM 2003), development indicators are not promising: Population growth, lack of manpower, problems with good governance, marginal economic growth and the burden of diseases like malaria, tuberculosis and HIV/AIDS have the effect that Tanzania depends heavily on foreign aid for health services.

Since independence, the Government of Tanzania has recognized the importance of health and has given it high priority. In 1994, the Health Sector Reform (HSR) was launched with the aim of improving equity, quality, accessibility and efficiency in the health sector, and with a focus on the poor and most vulnerable. Private sector participation is promoted and the authority of healthcare is decentralized to district and local levels (MOH 1994, 1999a, 1999b; Semali 2003). To facilitate the reforms and to develop a common funding approach with a commitment among stakeholders and partners, a sector-wide approach (SWAp) has been adopted (MOH 1994, 1999a, 1999b; Bürki 2001; Semali 2003).

In Tanzania, healthcare is delivered through both the public and the private sectors, the latter being divided into for-profit and non-profit services. This grouping follows the classification of the Ministry of Health (MOH), but sectors are sometimes difficult to delineate (Wyss et al. 1996; Weiss 2002). The healthcare system assumes a pyramidal referral pattern: the village post, dispensaries, health centres, district hospitals, regional hospitals and referral hospitals (MOH 2002). Not-for-profit organizations include private voluntary (PVOs), non-governmental (NGOs) and religious organizations. Christian missions provide 40% of all health services, and work in largely in rural areas, mostly under the umbrella of the Christian Social Service Commission (CSSC) (Muhume 2001). Other important faith-based providers are the Muslim services such as Bakwata and Aga Khan Health Services, and the Hindu Mandal. In this study, private-for-profit facilities are all those that aim to maximize profit through health services and include pharmacies, wholesalers, manufacturers, dispensaries, health centres and hospitals.

Drug Supply in Tanzania

In 1991, the MOH launched the National Drug Policy (MOH 1993). Tanzania was one of the first countries to adopt the essential drug concept and continues to promote it. The National Essential Drug List for Tanzania (NEDLIT) and the Standard Treatment Guidelines (MOH 1997a) were published in 1991 and updated in 1997. In 2001, a draft revision of the NEDLIT became available. The NEDLIT stratifies drugs by facility level, adapted to the educational level of the health staff.

The WHO rates Tanzania as a country with low access to essential drugs (50–79% of the population). The Swiss Agency for Development and Cooperation (SDC) stated in its review of the HSR in 2001 that the Tanzanian pharmaceutical sector is significantly underfunded (Bürki 2001). Despite

Table 2. Indicators important for the Tanzanian DD system (UNDP 2002; CIA 2005)

Indicator	Year	Tanzania
Geography		
Area, in sq km		945,000
Location		Eastern Africa, bordering the Indian Ocean, between Kenya and Mozambique
Paved roads, in %		5 (of 85,000 km)
Demographic Indicators		
Population	2001	35 million (estimated)
Annual population growth rate	2001	2.2%
Adult literacy rate at age 15	2000	76%
Population living in urban area	2001	33%
Epidemiological Indicators		
Life expectancy at birth, years	1990	50
Life expectancy at birth, years	2001	44
Under-five mortality rate per 1,000 live births	2001	165
Estimated HIV/AIDS prevalence rate	2001	7.8%
Economic Indicators		
Population living below USD 1 per day	2001	20%
Poverty line of USD 2 per day	2001	60%
GDP per capita in USD	2001	520
Health Sector		
Leading diagnosis for the whole country	1998	Malaria 37% Acute respiratory infections 13% Diarrhoeal diseases 6%
Expenditure on health as % of total government expenditure	2001	12.1%
Governments expenditure on health, in millions of USD	2002	84
External resources for health as % of the government health expenditure	2001	29.5%
Total expenditure on health as % of GDP	2001	4.4%
Total number of healthcare facilities	2000	4,717
Government or PPP-owned health facilities funded by the government	2000	3,747
Hospital beds per 1,000	2000	9
Physicians for the entire country	2001	355
Nurses for the entire country	2001	5,288
Pharmacists for the entire country	2001	42

Table 2. Continued

Pharmaceutical technicians for the entire country	2001	91
Population with sustainable access to essential drugs	1999	50–79%
Government expenditure on drugs as % of total health expenditure Thereof paid (Muhume 2001) By the government Through cost-sharing Through development partners with basket funding	2000	47% 50% 20% 30%
Population with sustainable access to an improved water source Urban Rural	2000	 90% 57%

developments such as the introduction of cost sharing and the significantly improved performance of the Medical Stores Department (MSD), the parastate wholesaler for the public and non-profit sectors, major structural problems still remain, such as the non-availability of qualified pharmaceutical staff, the absence of a clearly defined mandate for the staff in the pharmaceutical sector, lack of integration of the pharmaceutical sector into the healthcare system and insufficient health worker training in the essential drug concept (MOH 1997b; Wiedenmayer et al. 2000; Wiedenmayer et al. 2004). In 2001, Strategies for Enhancing Access to Medicines (SEAM), funded by Management Sciences for Health, assessed access to essential medicines in Tanzania (SEAM 2003). They identified gaps in drug availability, primarily in the public sector, and problems with quality and affordability of products and services, especially in the private retail sector. Geographical access was not perceived as a problem by the public. In MSD zonal stores, drug stock-outs occurred occasionally. On the other hand, availability does not seem to be a significant problem at mission health facilities. SEAM data revealed that the public cannot be assured of good drug quality for a significant proportion of drugs on the Tanzanian market.

Drug supply for health centres and dispensaries in the public sector is based on prepacked standardized kits as part of the National Essential Drug Programme (EDP). The composition of the kits is based on the NEDLIT and national morbidity data. The MSD is responsible for purchasing and distributing the kits. In 2001, 75% of the kit costs were paid by the government and 25% by the Danish International Development Agency (Danida). Although drugs provided by kits do not comply with the definition of in-kind DDs in this study, some health workers perceive them as drugs donated as gifts in-kind. This may be due to the fact that in the 1980s, kits were prepacked and fully financed from abroad, mostly by UNICEF and Danida (Hingora 2001).

Drug Donations for Tanzania

Tanzania has launched instruments for an effective regulation of DD processes, including guidelines for the importation of pharmaceuticals and DDs and the NEDLIT (MOH 1995, 1997a, 2000). By transferring the authority of healthcare to the district and local levels, health sector reforms have also led to a decentralized DD process. Within the HSR, the concept of a SWAp redefined the donors' role. Donors' funds are now pooled and earmarked for priority activities (basket funding) and within the SWAp system donors are responsible for synchronizing and reviewing their aid (Hutton et al. 2004).

The MOH has a regulatory overview. The chief pharmacist, i.e., the head of the pharmaceutical services section in the directorate of the curative health service, is responsible for the NEDLIT and the Donation Policy. The registrar, the director of the Pharmacy Board (since 2003 under the Tanzanian Food and Drug Authority, TFDA) is responsible for implementing the NEDLIT and for policies regarding the importation of drugs and is also in charge of the National Drug Quality Control Laboratory. The main regulations for handling DDs are the "Guidelines on donations of

drugs and medical equipment to the health sector for Tanzania Mainland, 1995," the "Guidelines for Importation of Pharmaceuticals, 2000" and the NEDLIT. Differences between the earlier published Tanzanian guidelines on DDs and the WHO-GDDs are as follows:

- Donors should understand Tanzania's DD policies.
- DDs have to be declared to the MOH for clearance and all importation of any pharmaceutical product requires approval by the Pharmacy Board and has to undergo a registration procedure.
- A financial contribution by the donor should be considered, since it may be more cost effective to buy drugs locally.

The Tanzanian GDDs from 1995 are currently undergoing revision and the release of updated GDDs is expected soon (Muhume 2001).

Both the public and not-for-profit sectors of Tanzania receive DDs for basic healthcare and as part of specific DD programs. The MSD is mandated to receive and store all in-kind DDs that are given to the government. Additionally, the MSD distributes the DDs given in the framework of programs within the country. These DDs are cleared at the port of Dar es Salaam and other harbours together with DDs given for the private-for-profit facilities. Christian umbrella organizations have their own clearing offices. Local pharmaceutical companies do not receive DDs; on the contrary, they are in-country donors of DDs.

With this background, the objectives of this descriptive study were to collect information on the situation of in-kind DDs in Tanzania, to assess the characteristics of the DD system in Tanzania and to collect stakeholder and recipient views on problematic areas and gaps in DD processes including all strategies of donating drugs.

Methods

Approach

This paper is part of a research project in Tanzania and Switzerland analyzing the knowledge, attitudes, perceptions and practices of stakeholders with regard to in-kind DDs for development aid at the local level. The design of the entire study relied on the triangulation of data and methods (KFPE 1998; Flick 2000). It employed a participatory approach, with the involvement of individuals at every level of decision-making, and its overall goal was to identify their priorities where problems with DDs exist and to publish effective suggestions for the optimization of DD systems.

The DD system is characterized by a DD process between a donor and a recipient system (Figure 1). Various stakeholders can be involved in the donor and recipient systems: NGOs, governmental organizations, private companies, private foundations, private donors, health facilities and patients.

Figure 1. Drug donation system (DD system)

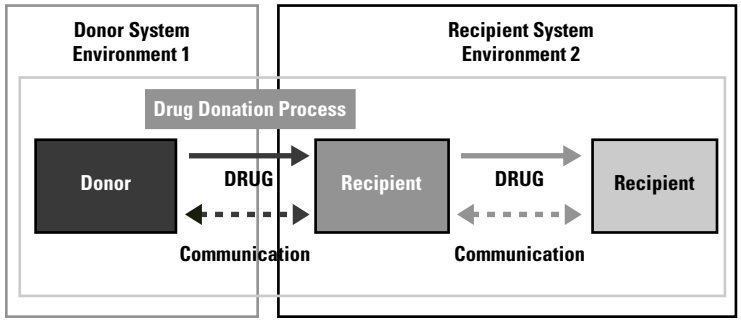


Table 3. Characteristics of the DD system

Determinants	Indicator	Guidelines for DDs		Results in Table
		WHO	Tanzania	
Environment				
Demographics	Population			No. 2
Epidemiology	Morbidity, Life expectancy, Prevalence of HIV/AIDS, Child mortality of under fives			No. 2
Economy	Poverty, GDDs per capita			No. 2
Education	Adult literacy rate			No. 2
Geography	Paved roads			No. 2
Health sector and DDs	Sectors involved, Distribution channels for DDs, Number of pharmacists and educated healthcare staff, Public spending for health, Control of importation of DDs			No. 2
National Drug Policy	Guidelines for DDs, Laws for importation, Essential drug list (EDL)		No. 4.1 No. 4.2a–c	No. 2
Resources and Structures				
Organizations	Characteristics of the organizations			No. 5/7
	Involvement in DD processes			No. 5
Staff competence	Accountability			No. 7
	Knowledge of GDDs			No. 8
Documents	List of needed drugs		No. 3	No. 8
	Quality criteria for DDs			
	Treatment criteria for DDs			No. 8
	Availability of GDDs			No. 8
Financial aspects	Shipment and custom fees	No. 12		No. 12
	Value of DDs			No. 9
	Payment for DDs			No. 9
	DDs in cash earmarked for buying drugs		No. 3	No. 5
Process				
Selection of drugs	Expressed need by recipient	No. 1		No. 10
	DDs part of the EDL of the country or of the WHO	No. 2	No. 4.2d	No. 11
Management	Origin of DDs			No. 10
	Coverage of drug supply with DDs			No. 10
	Use of DDs			No. 7
	Disposal of unwanted drugs			No. 10
Transparency	Evaluation of DD processes			No. 10

Table 3. Continued

Communication	Information by donors	No. 10	No. 3	No. 10
	Collaboration with partner organizations			No. 10
	Receipt of invoice documents	No. 10		No. 11
Quality of the Donated Drug				
Quality assurance	Certificate schemes on the quality of DDs	No. 4	No. 4.2h	No. 11
	Shelf life	No. 6	No. 4.2g	No. 11
	Unused drugs	No. 5	No 4.2j	No. 11
Presentation	Labelling	No. 7	No 4.2f	No. 11
Perception of Stakeholders				
Satisfaction of recipients	Long-term treatment, Implementation of GDDs, Relevance of DDs, Shipment and custom fees, Transparency in DD processes, Communication between donor and recipient, Infrastructure, Training of health-care staff, Quality of DDs			No. 12
Usefulness of DDs				No. 6

The focus in this paper is on the characteristics of the recipient system. To achieve a broad analysis and to structure the complex information, determinants and indicators were elaborated in a deductive process. They were based on experiences from an exploratory study, on Reich's research (Reich 1999), on WHO publications (MSH 1997; WHO 1999, 2000a, 2000b) and on results from previous publications on the impact of DDs, as summarized in Table 3. DDs should comply with the quality standards required in both the donor and the recipient country. In the WHO GDDs, the indicators for the minimal required quality of DDs are certification of a reliable source of the pharmaceutical product (e.g., WHO Certification Scheme on the Quality of Pharmaceutical Products), shelf life, presentation, packaging, labelling, absence of unused drugs (drugs from patients returned to pharmacies and free samples given to health professionals) and documentation (WHO 1999). The indicators compiled in a framework for analysis (Table 3) enabled the formulation of quantitative and open questions to assess the characteristics of the DD system. Data were collected by interviews with key persons in an exploratory study and by a questionnaire.

Exploratory Study

Data collection in Tanzania was initiated with an exploratory study in 2000 to promote participatory collaboration. The idea was to learn about personal views concerning DDs at the local level, to develop an information exchange and to elaborate the objectives of the main study and the methodological tools. Unstructured key informant interviews were used, based on a snowball sampling. In February 2000, 45 key persons (39 from Dar es Salaam, five from Ifakara and one from Dodoma) from each sector of the health services were visited and interviewed.

Each interviewee had experience with DDs. Main outcomes were that DDs are helpful in (a) temporarily bridging gaps when drugs are missing in basic healthcare or (b) for fulfilling specific public health goals. Many problems in DD processes were pointed out, such as unsatisfactory communication and a low level of transparency, different perceptions and motivations between donors and recipients, insufficient drug quantities for long-term treatments, irrelevant drugs for the diseases

prevalent in the country, inadequate logistics and infrastructure, high custom fees and shipment costs, poor drug quality, insufficient training of healthcare staff and insufficient implementation of guidelines and policies. These perceptions were integrated in the creation of the questionnaire.

Field Study – Questionnaire Survey

The questionnaire we developed (Questionnaire 2001) contained a set of 16 open questions to gather perceptions and opinions, 39 quantitative questions for basic information, followed by 12 open questions to further develop the quantitative questions. The questionnaire was validated with a pilot questionnaire to check form and content. Only minor changes were necessary after the pilot study.

In June 2001, 1,383 questionnaires in English and Swahili were sent out with cover letters and prepaid envelopes for the return of completed questionnaires. Two months later, a reminder was sent out to non-respondents. Data gathering was completed in December 2001. As an incentive, the WHO-GDDs for DDs, provided by the WHO Geneva, were given to each respondent who returned a questionnaire.

Stakeholders of all sectors involved in healthcare during the year 2000 were contacted in Tanzania. Address lists as complete and updated as possible were collected for all groups of recipients and donors of each sector (public, religious, private-non-profit and private-for-profit) and from the entire country. All the addresses were taken from some lists; from others, only a randomized sample, depending on the length of the list. Questionnaires were sent out either directly to an organization or to a diocese or district medical office with the invitation to distribute the questionnaires to health facilities of their diocese or district. To assess the non-respondents to the questionnaire, 50 individuals from the non-responding sample were selected (randomized and stratified by sectors) and followed up by telephone call.

The questionnaire was designed and processed with the software TELE*form*® Standard Version 7.0 from Cardiff Inc. Data quality assurance was done by a double control of the entire dataset. The data were transferred to a Microsoft® Access database and analysis was performed with Microsoft® Excel. Chi-square analyses (χ^2) were performed to assess differences between sectors using SPSS 13.0 for Windows. Generally, differences between the sectors were highly significant; the text specifies where this was not the case. Details of the calculation are given below the tables. Qualitative data from the open-ended questions were analyzed using content analysis. In this study, the deductive text analysis was based on the concepts of Mayring (Mayring 1997; Flick 2000). Key words used in this analysis were derived from important categories of the DD system as listed in Table 3 and from most-cited terms.

Approval of the Research Clearance, Tanzania, RC 2000/25 was given in 2000 from the Commission of Science and Technology, COSTEC, Dar es Salaam. The ethical review was done by the National Institute for Medical Research (NIMR) in Tanzania in 2002.

Results and Discussion of the Questionnaire Survey

Due to the multi-faceted nature of the study, the presentation of results is combined with comments and discussion to track the evolving analysis.

Respondent Rates

A total of 1,383 postal questionnaires were sent out countrywide (Table 4). Of these, 496 were returned and 467 were completed. To achieve a broad coverage of respondents, all sectors were approached and the addressed institutions were invited to distribute copies of the questionnaires. This resulted in questionnaires that were not filled in properly (n = 29) or were not analyzable (n = 56), mainly because of duplicates. Of the resulting eligible sample of 411 (30%) questionnaires – the so-called respondents (recipients and non-recipients together) – 47% were in Swahili. The target of one third returned questionnaires was achieved.

Table 4. Description of the questionnaire survey sample

Questionnaire	Public Sector (*n* / %)		Relig. Sector (*n* / %)		NGO (*n* / %)s		Private-for-profit (*n* / %)		Not identified (*n*)	Total (*n* / %)	
Mailed postal	442	*	531	*	169	*	85	*	*156	1383	**100%**
Returned	151	*	212	*	75	*	50	*	*8	496	**36%**
Completed	145	31%	208	45%	66	14%	48	10%	0	467	**34%**
Eligible	119	29%	181	44%	64	16%	47	11%	0	411	**30%**

*Allocation of some organizations to a sector was not possible.

Table 5. Characteristics of respondents

Question	Answer	All Respondents *N* 411=100%	Public Sector *N* 119=100%	Religious Sector *N* 181=100%	NGOs *N* 64=100%	Private-for-profit Sector *N* 47=100%
1. Which category identifies your organization best?	Hospital	29.0%	37.0%	40.3%	0.0%	4.3%
	Health Centre	8.5%	14.3%	7.7%	3.1%	4.3%
	Dispensary	20.9%	15.1%	27.1%	0.0%	40.4%
	Political, organizational, technical level	25.5%	13.4%	17.7%	89.1%	0.0%
	Manufacturer	1.2%	0.8%	0.0%	0.0%	8.5%
	Wholesaler	1.5%	0.0%	1.1%	0.0%	8.5%
	Pharmacy	3.9%	0.0%	0.0%	0.0%	34.0%
	No answer	9.5%	19.3%	6.1%	7.8%	0.0%
2. Is drug supply the main activity of your organization?	Yes	40.4%	49.6%	39.2%	15.6%	55%
	No	54.0%	42.9%	55.8%	79.7%	41%
	No answer	5.6%	7.6%	5.0%	4.7%	4%
3. Is your organization involved in DDs as gifts in-kind?	Yes[a]	50.4%	61.3%	58.0%	35.9%	12.8%
	No	47.4%	36.1%	40.3%	59.4%	87.2%
	No answer	2.2%	2.5%	1.7%	4.7%	0.0%
4. Has your organization ever received earmarked money in cash for buying drugs?	Yes[b]	16.1%	13.4%	24.3%	9.4%	0.0%
	No	61.3%	52.9%	55.2%	79.7%	80.9%
	I don't know	10.9%	18.5%	12.2%	0.0%	2.1%
	No answer	11.7%	15.1%	8.3%	10.9%	17.0%

[a] Public and religious sector vs. NGOs: $\chi^2 = 95.757$, $p < 0.001$.
[b] Religious sector vs. public sector $\chi^2 = 49.309$, $p < 0.001$. / Religious sector vs. NGOs $\chi^2 = 22.213$, $p < 0.001$.

To evaluate the return rate and the sample consistency, a sample of non-respondents were contacted and their responses recorded and analyzed. Only 20 of the 50 randomly chosen non-respondents were reachable. Of these, 17 (85%) said they had not received the questionnaire. This may largely explain the non-response rate in the questionnaire survey, with geographical and logistical problems as well as incorrect address lists playing a role.

The response rate to the various questions was very uneven and often varied between sectors. Public and religious sectors had a higher response rate to questions concerning quality aspects (e.g., Q. 31 ff, Table 11), while NGOs had a higher response rate to questions requiring more technical knowledge (e.g., Q 8, 15, Tables 7, 8). A similar pattern emerged for the answer "I don't know." NGO respondents were in general more informed about the DD process (e.g., Q 4, 10, 13, 20, Tables 5, 8, 10). When data were not available or the question was an open one, the "no answer" rate was more than 20% (e.g., Q 17, 21, Tables 9, 10). Question 3 on the receipt of DDs and the questions on familiarity with GDDs for DDs (Q 12, 15, Table 8) were answered by nearly every respondent. Even though the response "no answer" tended to be frequent, the responses were consistent and logical (e.g., Q 18 compared with 19, Q 24 with 25, Tables 9, 10), except the answers to Q 20 and 20a.

Analysis of Respondents

A summary of the characteristics of the respondents for each sector is given in Table 5. Basic health-care was offered by 66% of the public sector, 75% of the religious sector and 83% of the private-for-profit sector facilities, but 89% of the NGOs worked mainly on an organizational or technical level. Of all respondents, 40% reported that drug supply was the main activity of their organization. The other 54% specified their activities in an open question. The resulting 363 answers were classified as follows: 76% activities in health services in general (mostly curative, preventive and promotive health services and education as well as program activities), 4% technical support to the health system, 8% religious activities and 12% various other activities.

Half of the respondents (51%) were involved in DDs, mainly in the public and religious sectors, and 16% received earmarked money in cash. It is apparent that public and religious facilities that worked directly with patients were receiving more DDs than facilities working on a more administrative level, such as NGOs. The religious sector, with its well-organized network of support and providers, received the most earmarked donations in cash (25%). This complies with the recommendation of the Tanzanian GDDs to promote donations in cash (MOH 1995).

The perception of DDs for all respondents was assessed with two open questions (Table 6). Eighty percent of all respondents answered the question "In which situation do you consider DDs as useful?"; of these, 29% mentioned economic aspects as the most important. This was underlined through the second question on the reasons for supporting the drug supply system through DDs, where more than 55% gave economic aspects and support of poor people as positive reasons. Drug availability was rated lower, although drugs in health facilities were often lacking because of limited procurement funds.

This view reflects the situation of the country and mirrors the perception of Reich's interviewees, who considered DDs especially important for the poor who cannot afford cost sharing. Poverty changes perception and hinders a critical view of DDs. Another positive aspect that respondents emphasized was the important public health impact of DDs given within DD programs.

Reasons against supporting drug supply with DDs focused primarily on quality aspects (41%): They did not express a basic refusal of DDs but characterized the low quality of DDs as a notable problem. The expiry date, a major problem, is easy to assess and was perceived as an indicator of the donor's attitude.

DD System

This paper focuses on the analysis of recipients of DDs. But six respondents of the private-for-profit sector involved in DDs (two dispensaries, one hospital, one manufacturer, two private pharmacies) pointed out that they were donors in their country. They were therefore excluded, giving a new sample of recipients (N = 201).

Structure and Resources

Characteristics of the recipient organizations (Table 7) did not differ from those of the respondents (Table 5): 82% of the religious and 67% of the public facilities were delivering healthcare in hospitals, health centres and dispensaries, and 87% of NGOs were working more in organizational, technical or preventive services.

Although the questionnaires were sent out to the head or director of district medical offices, dioceses or health facilities, with the assumption that they would select the person responsible for DDs to answer the questionnaires, an average of 52% of recipients were in charge of DDs (74% within NGOs, 53% in the religious and 44% in the public sector). A reason for differences among the sectors might be that the questionnaires were sent to a member of the administration who often has overall responsibility for DDs but is not the person working directly with patients and drug supply. Another reason for low accountability might be that there is no person in charge of DDs. This supports the HSR recommendation that responsibilities in the pharmaceutical sector have to be clearly defined at every level of service (MOH 1997).

A list of needed drugs (Table 8) had been worked out in detail by 66% of religious organizations and 52% of the NGOs, but by only 18% of public organizations. This correlates with the result observed by SEAM that services in the religious sector have less problems with drug availability (SEAM 2003) and with the fact that NGOs had, in general, more clearly defined structures. A list of needed drugs requires an essential drug list (EDL) and information on the stock of available drugs, and it helps to specify requests. During the period of data collection, the public sector health centres and dispensaries were provided with prepacked kits, which are delivered monthly. The motivation to establish or to use a list of needed drugs was much lower in this sector and, thus, unwanted DDs could not be refused as easily. The existence of a set of special criteria for using DDs in the treatment of patients was reported by 70% of the NGOs and 30% of the public and the religious sectors. This result again confirmed that international NGOs, in particular, are involved in well-structured programs for the treatment of single diseases with DDs (Shretta et al. 2000).

On average, 45% of recipients were familiar with the Tanzanian GDDs and 30% with the WHO-GDDs. Fifty-four percent of recipients from the religious sector, 35% from the public sector and an equal percentage of NGOs were familiar with the Tanzanian GDDs. The WHO Guidelines were known equally by 39% in the religious and NGO sectors, but by only 15% in the public sector. Recipients in NGOs knew both the WHO-GDDs and the Tanzanian GDDs to a similar degree. The question on whether recipients had copies of the GDDs gives a similar picture: They were more available in the religious and public sectors, less so in the NGOs. NGOs and religious facilities had, to the same degree, more copies of WHO guidelines than the public sector. Pushing the distribution of both the Tanzanian and the WHO guidelines in the later 1990s through the CSSC had a positive effect (Kigadye 2001). On the question of whether the WHO-GDDs influence the practice of the organization, 56% of recipients gave no answer or did not know. The level of information was more advanced in the religious sector and within NGOs, presumably related to their background in an international setting. On the whole, less than 50% of the recipients had copies of printed material. For questions on the familiarity with and availability of GDDs, "no answer" and "I don't know" responses were very low and the consistency among the responses was high. This high response rate shows the importance of a good donation practice and the need for a tool like the GDDs.

Only 30% of recipients were able to estimate the monetary value of DDs as a drug supply resource for their organization (Table 9). NGOs were best able to estimate the monetary value, with 57% responding; the public sector had the lowest ability, with only 15% of positive answers.

Table 6. Perception of DDs of respondents

Question	Answer	
5. In which situation do you consider DDs as useful?	**Usefulness of DDs: From 328 (80%) respondents, a total of 521 (=100%) answers were given**	
	Economic aspects, which included better affordability in general, fighting against poverty, missing funds 29%	
	DDs for specific needs and for programs (e.g., tuberculosis, HIV/AIDS, chronic diseases, malaria)	17%
	Guarantee of the availability of drugs	14 %
	Emergency situations such as disasters, refugee camps, epidemic outbreaks	13 %
	Other features included usefulness in any situation, donations in cash preferred, supplement of the essential drug list	17%
6. There are reasons for and against supporting the drug supply system through in-kind DDs. Suggest some of them.	**Positive features of DDs: From 289 (70%) respondents, a total of 333 (=100%) answers were given**	
	Economic aspects such as better affordability of drugs and reductions in costs for purchasing drugs	37%
	Support of poor people	18%
	Availability of drugs	16%
	DDs perceived as positive in any situation	7%
	Other features included better quality of DDs than of locally manufactured drugs, supporting local needs, DDs for emergency situations	32%
	Negative features of DDs: From 289 (70%) respondents, a total 250 (=100%) answers were given	
	Short shelf life of DDs as a quality aspect	29%
	DDs often do not meet local needs	13%
	Other quality aspects such as poor labelling of DDs, counterfeit drugs	12%
	DDs not part of the NEDLIT	8%
	Other features included hampering the building of local competence, no sustainability of DDs, dependency on donors	38%

The high proportion of "no answer" and "I don't know" responses to the question on the value of DDs indicates that data are not available, that transparency is very low or that this aspect has never been analyzed. However, knowledge of the value of DDs is a prerequisite for judging the economic impact of DDs on drug supply.

On the other hand, recipients had clear ideas about the pricing policy for DDs, and more than 90% indicated whether patients had to pay for DDs. The pricing policy was applied and perceived differently in the various sectors. In 74% of religious facilities, patients had always or at least sometimes contributed financially to DDs, while only 26% paid always or at least sometimes

Table 7. Characteristics of the recipients' organizations

Question	Answer	All Recipients	Public Sector	Religious Sector	NGOs
	Single Answers	*N* 201=100%	*N* 73=100%	*N* 105=100%	*N* 23=100%
7. Could you specify the category which describes your organization?	Hospital	39.9%	30.1%	55.2%	0%
	Health Centre	11.4%	17.8%	8.6%	4.3%
	Dispensary	15.9%	19.2%	18.1% 2)	0%
	Political, technical or organizational level	22.3%	13.7% 1)	13.3% 3)	87%
	Manufacturer or wholesaler	1.5%	1.4%	1.9%	0%
	No answer	9%	17.8%	2.9%	8.7%
	1) 5 District Medical Offices, 3 MOH, 2 International Organizations (Public Sector)				
	2) 18 Mission Dispensaries, 1 Islamic Dispensary (Religious Sector)				
	3) 10 Dioceses, 4 Islamic Organizations (Religious Sector)				
8. Are you the person in charge of DDs in your organization?	Yes[a]	52.2%	43.8%	53.3%	73.9%
	No	38.8%	46.6%	37.1%	21.7%
	No answer	9.0%	9.6%	9.5%	4.4%
	Multiple answers	*N* 359=100%	*N* 156=100%	*N* 169=100%	*N* 34=100%
9: For what purposes did you receive DDs?	For primary healthcare	31.8%	32.7%	32%	26.5%
	For secondary and tertiary healthcare	15%	5.8%	24.3%	11.8%
	For natural disasters	7.2%	11.5%	4.1%	2.9%
	For refugee camps and during wars	2%	2.6%	0.6%	5.9%
	As partner of a program	18.7%	21.1%	15.3%	23.5%
	As earmarked in-kind DDs for specific diseases	10.3%	11.5%	8.9%	11.8%
	For research activities	2.5%	1.9%	1.8%	8.8%
	On request of individuals	5.8%	3.9%	7.7%	5.9%
	I don't know	2.2%	3.9%	1.2%	0%
	Other reasons	4.5%	5.1%	4.1%	2.9%
	Specification	*N* 114=100%	*N* 51=100%	*N* 54=100%	*N* 9=100%
9a: Specification of the receipt of DDs for primary healthcare in Q 19	As prepacked kits	43.0%	72.6%	16.7%	33.3%
	DDs for basic needs	49.1%	23.5%	74.1%	44.5%
	No answer	7.9%	3.9%	9.2%	22.2%

[a] Public vs. religious sector χ^2= 121.002; $p < 0.001$ / Religious sector vs. NGOs χ^2= 37.214; $p < 0.001$ / Public sector vs. NGOs χ^2= 31.534; $p < 0.001$.

Table 8: Policies of the recipients' organizations

Question	Answer	All Recipients	Public Sector	Religious Sector	NGOs
	Single Answers	*N* 201=100%	*N* 73=100%	*N* 105=100%	*N* 23=100%
10. Do you have a list of needed drugs, which you give to the donors?	Yes[a]	46.8%	17.8%	65.7%	52.2%
	No	39.8%	61.7%	24.8%	39.1%
	I don't know	6%	12.3%	2.8%	0%
	No answer	7.4%	8.2%	6.7%	8.7%
11. Has your organization special criteria for deciding to treat a patient with donated drugs?	Yes[b]	34.8%	32.9%	28.6%	69.6%
	No	50.2%	53.4%	56.2%	13.0%
	No answer	14.9%	13.7%	15.2%	17.4%
12. Are you familiar with the WHO Guidelines for DDs?	Yes[c]	30.3%	15.1%	39.1%	39.1%
	No	65.7%	83.5%	55.2%	56.5%
	No answer	4%	1.4%	5.7%	4.4%
13. Do you have a copy of the WHO Guidelines for Drug Donations?	Yes[d]	21.4%	8.2%	29.5%	26.1%
	No	70.1%	87.7%	58.1%	69.6%
	I don't know	3%	2.7%	3.8%	0%
	No answer	5.5%	1.4%	8.6%	4.3%
14. Did these Guidelines influence practices with regard to drug donations in your organization?	Yes	17.4%	9.6%	22.9%	17.4%
	No	26.9%	26.0%	28.6%	21.7%
	I don't know	39.3%	53.4%	27.6%	47.8%
	No answer	16.4%	11.0%	21.0%	13.0%
15. Are you familiar with the "Guidelines on Donations for Tanzania Mainland" of the MOH?	Yes[e]	45.3%	35.6%	54.3%	34.8%
	No	51.7%	63.0%	41.0%	65.2%
	No answer	3.0%	1.4%	4.8%	0.0%
16. Do you have a copy of the "Guidelines on Donations for Tanzania Mainland" of the MOH?	Yes[f]	33.8%	26.0%	44.8%	8.7%
	No	60.2%	71.2%	45.7%	91.3%
	I don't know	2.5%	1.4%	3.8%	0.0%
	No answer	3.5%	1.4%	5.7%	0.0%

[a] Religious sector and NGOs vs. public sector: $\chi^2 = 100.705$; $p < 0.001$.
[b] Religious and public sector vs. NGOs: $\chi^2 = 13.878$; $p < 0.001$.
[c] Religious sector and NGOs vs. public sector: $\chi^2 = 49.947$; $p < 0.001$.
[d] Religious sector and NGOs vs. public sector: $\chi^2 = 31.198$; $p < 0.001$.
[e] Public sector and NGOs vs. religious sector: $\chi^2 = 93.958$; $p < 0.001$.
[f] Religious and public sector vs. NGOs: $\chi^2 = 50.798$; $p < 0.001$.

in NGOs and in the public sector. Furthermore, 56% of recipients in the religious sector perceived payment for DDs as justifiable, but only 23% of the public and 30% of the NGOs agreed. Possible reasons are that religious organizations have had a much longer tradition with DDs and may know the educational aspect of even a very low financial contribution. For example, under the umbrella of the CSSC, religious health facilities have established new financing schemes such as a Revolving Drug Fund (RDF) (Kuper and Njau 1998). The public and NGO sectors have a long tradition with cost-free health services and therefore have a different view about pricing policy and the implementation of financing schemes, although cost sharing was established as an element of the HSR.

Processes

The highest proportion of DDs were of European origin (an average of 42%), followed by 15% from North America and 12% from Africa (Table 10). Reich estimated that 60–90% of DDs, a much higher proportion, were coming from Europe, based on the assumption that religious health facilities had a strong relationship with their mother houses. In this study, the religious sector stated that 47% of the DDs received were from Europe. An average of 23% of DDs were received from Tanzanian donors (34% in the public sector, 18% in religious facilities and 13% in NGOs). This discrepancy could be explained by recipients' difficulties in assigning the origins of drugs contained in the kits. They are partly produced in-country and not perceived as DDs of foreign origin.

Table 9. Economic aspects of the recipient's organizations

Question	Answer	All Recipients	Public Sector	Religious Sector	NGOs
	Single Answers	N 201=100%	N 73=100%	N 105=100%	N 23=100%
17. What is the value of the DDs received in 2000?	Value known[a]	27.9%	15.1%	30.5%	56.5%
	I don't know	44.3%	63%	38.1%	13%
	No answer	27.8%	21.9%	31.4%	30.5%
18. Do patients have to pay for donated drugs?	Always	15.4%	6.8%	23.8%	4.3%
	Sometimes[b]	35.8%	19.2%	50.5%	21.7%
	Never	37.3%	63.0%	14.3%	60.9%
	I don't know	3.5%	2.7%	3.8%	4.3%
	No answer	8.0%	8.2%	7.6%	8.7%
19. Do you think is it justifiable to sell donated drugs?	Yes[c]	41.3%	23.3%	56.2%	30.4%
	No	53.2%	71.2%	38.1%	65.2%
	No answer	5.5%	5.5%	5.7%	4.3%

[a] Public vs. religious sector: $\chi^2 = 81.549$; $p < 0.001$ / Religious sector vs. NGOs: $\chi^2 = 45.012$; $p < 0.001$ / Public sector vs. NGOs $\chi^2 = 9.530$; $p = 0.002$.
[b] (Answers always and sometimes) Public sector and NGOs vs. religious sector: ($\chi^2 = 193.148$; $p < 0.001$.
[c] Public sector and NGOs vs. religious sector: $\chi^2 = 129.263$; $p < 0.001$.

The main purpose for using DDs (32%) in every sector was primary healthcare (PHC) (Table 7). Differences in the use of DDs were recorded for secondary and tertiary healthcare, where religious sector involvement was 24% and public sector involvement only 6%. The public sector and NGOs were more involved as partners in programs and in the treatment of specific diseases. Seventy-five

Table 10. DD process

Question	Answer	All Recipients	Public Sector	Religious Sector	NGOs
20. Origin of DDs in 2000?	**Multiple Answers**	*N* 267=100%	*N* 102=100%	*N* 136=100%	*N* 29=100%
	Asia	6.3%	13.7%	2.2%	0%
	Africa	11.6%	10.8%	10.2%	20.7%
	Europe	41.6%	35.3%	47.1%	37.9%
	North America	14.6%	14.7%	14%	17.2%
	Other Regions	6.4%	4.9%	6.6%	10.4%
	I don't know	7.5%	11.8%	5.9%	0%
	No DDs in 2000	12%	8.8%	14%	13.8%
20a. Did you receive DDs from Tanzanian donors in 2000?	**Single Answers**	*N* 201=100%	*N* 73=100%	*N* 105=100%	*N* 23=100%
	Yes[a]	23.4%	34.2%	18.1%	13%
	No	61.2%	38.4%	73.3%	78.3%
	I don't know	8%	17.8%	2.9%	0%
	No answer	7.4%	9.6%	5.7%	8.7%
21. What percentage of your drug supply was covered in 2000 by DDs?	0–10%[b]	44.3%	34.2%	53.3%	34.8%
	11–50%	14.4%	11%	17.1%	13%
	51–90%	6.5%	6.9%	3.8%	17.4%
	90–100%[c]	9.4%	16.4%	2.9%	17.4%
	No answer	25.4%	31.5%	22.9%	17.4%
	The following row presents the average coverage of the drug supply through DDs. "No answers" are neglected, because it is assumed that the non-respondents for this question have a similar average coverage.				
	Average of coverage	26.9%	37.1%	17.1%	41.6%
22. What percentage of drugs received did your organization have to dispose of?	0–10%	47.8%	41.1%	53.3%	43.5%
	11–50%	6.0%	6.8%	4.8%	8.7%
	51–90%	3.0%	1.4%	4.8%	0.0%
	91–100%	0.5%	0.0%	1.0%	0.0%
	No answer	42.8%	50.7%	36.2%	47.8%
23. Has your organization ever carried out an evaluation of your donation processes?	Yes[d]	22.9%	16.4%	23.8%	39.1%
	No	52.2%	50.7%	53.3%	52.2%
	I don't know	16.9%	24.7%	15.2%	0.0%
	No answer	8.0%	8.2%	7.6%	8.7%

Table 10. Continued

24. Did you receive in 2000 donations that you specifically asked for?	Exclusively[e]	16.9%	13.7%	19.0%	17.4%
	Partly[e]	28.4%	16.4%	35.2%	34.8%
	No	35.3%	39.7%	31.4%	39.1%
	I don't know	8.0%	12.3%	5.7%	4.3%
	No answer	11.4%	17.8%	8.6%	4.3%
25. Did you receive in 2000 donations that you had not asked for?	Exclusively[f]	3.5%	2.7%	3.8%	4.3%
	Partly[f]	34.8%	37.0%	38.1%	13.0%
	No	44.3%	31.5%	47.6%	69.6%
	I don't know	8.5%	17.8%	3.8%	0.0%
	No answer	9.0%	11.0%	6.7%	13.0%
26. Does your organization cooperate with partner organizations?	Yes	34.2%	28.8%	36.2%	43.5%
	No	25.9%	17.8%	31.4%	26.1%
	I don't know	27.9%	42.5%	21%	13%
	No answer	11.9%	10.9%	11.4%	17.4%
27. Is your organization informed beforehand about the composition and the date of shipment of the donations?	Always[g]	29.9%	9.6%	41.9%	39.1%
	Sometimes[g]	19.4%	5.5%	29.5%	17.4%
	Never	20.9%	37.0%	10.5%	17.4%
	I don't know	18.4%	35.6%	7.6%	13.0%
	No answer	11.4%	12.3%	10.5%	13.0%
28. Does your organization receive invoice documents with the DDs?	Always[h]	27.9%	11.0%	38.0%	34.8%
	Sometimes[h]	15.4%	8.2%	20.0%	17.4%
	Never	29.4%	42.4%	21.0%	26.1%
	I don't know	16.4%	27.4%	10.5%	8.7%
	No answer	10.9%	11.0%	10.5%	13.0%
29. Are the drugs received included in the National Drug List of Tanzania?	Exclusively[i]	20.4%	23.3%	21.0%	8.7%
	Partly[i]	44.8%	46.6%	47.6%	26.1%
	No	14.9%	9.6%	15.2%	30.4%
	I don't know	7.5%	9.6%	3.8%	17.4%
	No answer	12.4%	11.0%	12.4%	17.4%

Table 10. Continued

30. Are the drugs received included in the WHO Essential Drug List?	Exclusively[j]	20.9%	13.7%	26.7%	17.4%
	Partly[j]	30.3%	31.5%	32.4%	17.4%
	No	10.0%	2.7%	12.4%	21.7%
	I don't know	25.9%	41.1%	15.2%	26.1%
	No answer	12.9%	11.0%	13.3%	17.4%

[a] Religious sector and NGOs vs. public sector: $\chi^2 = 58.609$; $p < 0.001$.
[b] Public sector and NGOs vs. religious sector: $\chi^2 = 146.033$; $p < 0.001$.
[c] Public sector and NGOs vs. religious sector: $\chi^2 = 19.185$, $p < 0.001$.
[d] Public vs. religious sector: $\chi^2 = 67.184$; $p < 0.001$ / Religious sector vs. NGOs: $\chi^2 = 68.610$; $p < 0.001$ / Public sector vs. NGOs $\chi^2 = 8.469$, $p = 0.004$.
[e] (Answers exclusively and partly) Religious sector and NGOs vs. public sector: $\chi^2 = 65.377$; $p < 0.001$.
[f] (Answers exclusively and partly) Religious and public sector vs. NGOs: $\chi^2 = 41.825$; $p < 0.001$.
[g] (Answers always and sometimes) Religious sector and NGOs vs. public sector: $\chi^2 = 41.825$; $p < 0.001$.
[h] (Answers always and sometimes) Religious sector and NGOs vs. public sector: $\chi^2 = 150.209$; $p < 0.001$.
[i] (Answers exclusively and partly) Religious and public sector vs. NGOs: $\chi^2 = 48.605$, $p < 0.001$.
[j] (Answers exclusively and partly) Religious and public sector vs. NGOs: $\chi^2 = 27.297$, $p < 0.001$.

percent of public health facilities covered their basic needs through kits. The results on the purpose for receiving DDs provided information about the activities of organizations in the sectors. Religious facilities worked more in primary health services and in rural areas. Involvement of NGOs in programs and in the treatment of specific diseases was more on an administrative level. Involvement of the public sector in programs showed the shift from a more vertical distribution to an integration of DDs in basic healthcare

A large proportion of all recipients (44%) covered 10% or less of their drug supply with DDs: 53% in the religious sector and 34% in the public sector and in NGOs; only 17% of the public and non-governmental sectors and only 3% of the religious sector covered their drug supply with 91–100% DDs. At first glance, this seems a small contribution of DDs to the drug supply of organizations. But, on average, 27% of the drug supply was covered by DDs: 42% in the non-governmental, 37% in the public and 17% in the religious sector. This distribution among sectors was expected to be rather the reverse, but an explanation can be provided: The average of 37% in the public sector might be due to the perception of kits as DDs and to participation in programs. The NGO average of 42% might also be due to participation in programs. Local NGOs sometimes cover their entire drug supply through DDs. On average, 25% of recipients had no answer to this question. Either the data on DDs were not available, process steps were not transparent or the respondents were not in charge of DD issues. This assumption is strengthened by a similar reply to the question on the value of DDs. Since Reich interviewed only nine health facilities, it is difficult to rate and compare his estimate of coverage (Reich 1999).

An evaluation of DD processes was carried out by 39% of NGOs, 24% of religious organizations and 16% of public facilities. In each sector, more than 50% have never done an evaluation. This relates to a lack of data for other questions, such as the value of DDs or the coverage of the drug supply by DDs.

Almost 70% of DDs in the public and religious sectors were always or partly included in the Tanzanian EDL and 50% in the WHO EDL. Only 35% of DDs from NGOs were always or partly included in the Tanzanian and the WHO EDL.

Of all recipients, an average of 45% said that the DDs they received had been exclusively or partly requested. The religious sector had the highest rate with 54%, followed by the NGOs with 50% and the public sector with 30%, while 30% of the public sector gave no answer. In contrast, only 17% of NGOs and about 40% of public and religious facilities received DDs they had not requested. Interviewees in Reich's study expressed concerns that donors did not provide the types

of products expected, shipments did not contain all the items that were requested and the products were not appropriate (Reich 1999). Only 15% of our recipients in the public sector were always or sometimes informed beforehand about the composition and the date of shipment, in contrast to 71% in the religious and 56.5% in the non-governmental sectors. The same picture emerged for invoice documents: 19% of recipients in the public sector, 59% in the religious sector and 52% of NGOs always or sometimes received invoices. Communication between donors and recipients was better developed in the religious and non-governmental sectors.

Table 11. Quality of donated drugs

Question	Answer	All Recipients	Public Sector	Religious Sector	NGOs
	Single Answers	*N* 201=100%	*N* 73=100%	*N* 105=100%	*N* 23=100%
31. How long is the average shelf life of the DDs received?	Min. 1 year[a]	35.8%	23.3%	41.9%	47.8%
	6 to 12 months	24.4%	30.1%	23.8%	8.7%
	Up to 6 months	12.9%	19.2%	10.5%	4.3%
	Expired	5.5%	4.1%	7.6%	0.0%
	I don't know	8.0%	11.0%	5.7%	8.7%
	No answer	13.4%	12.3%	10.5%	30.4%
32. Are the DDs labelled in a local language?	Always[b]	29.4%	38.4%	28.6%	4.4%
	Sometimes[b]	27.4%	26.0%	29.5%	21.7%
	Never	25.9%	20.6%	26.7%	39.1%
	I don't know	6.0%	2.7%	5.7%	17.4%
	No answer	11.4%	12.3%	9.5%	17.4%
33. Does your organization receive a quality certificate with the DDs?	Always[c]	11.9%	5.5%	16.2%	13.0%
	Sometimes[c]	10.9%	5.5%	16.2%	4.3%
	Never	40.8%	42.5%	38.1%	47.8%
	I don't know	22.9%	35.6%	15.2%	17.4%
	No answer	13.4%	11.0%	14.3%	17.4%
34. Does your organization receive "unused" drugs (drugs returned by patients to pharmacies)?	Exclusively	0.5%	1.4%	0.0%	0.0%
	Partly[d]	14.4%	12.3%	18.1%	4.3%
	No	66.2%	67.1%	64.8%	69.6%
	I don't know	6.0%	5.5%	5.7%	8.7%
	No answer	12.9%	13.7%	11.4%	17.4%

[a] Religious sector and NGOs vs. public sector: $\chi^2 = 196.710$; $p < 0.001$.
[b] (Answers always and sometimes) Public vs. religious sector: $\chi^2 = 81.549$; $p < 0.001$ / Religious sector vs. NGOs: $\chi^2 = 60.782$, $p < 0.001$ / Public sector vs. NGOs $\chi^2 = 10.082$, $p = 0.001$.
[c] (Answers always and sometimes) Public vs. religious sector: $\chi^2 = 79.067$; $p < 0.001$ / Religious sector vs. NGOs: $\chi^2 = 58.447$, $p < 0.001$ / Public sector vs. NGOs $\chi^2 = 4.321$, $p = 0.038$.
[d] Public vs. religious sector: $\chi^2 = 47.792$; $p < 0.001$ / Religious sector vs. NGOs: $\chi^2 = 108.213$, $p < 0.001$ / Public sector vs. NGOs $\chi^2 = 3.517$, $p = 0.061$.

Quality of DDs

Quality criteria were based on the minimal requirements of the Tanzanian and WHO GDDs (Table 11). In this study, short expiry dates were perceived as one of the major negative arguments against DDs (Q 6). Forty-eight percent of the non-governmental, 42% of the religious and 23% of the public facilities received DDs with a remaining shelf life of 1 year or more, the average shelf life of 6 months up to more than 1 year was 60%, and an average of less than 6% of the DDs had expired. WHO and Tanzanian GDDs require a minimum shelf life of 1 year. In each sector, less than 50% fulfilled this requirement. This relates to the perception of all stakeholders that the expiry date was a major problem. The shelf life is important in countries with weak infrastructures (e.g., delays in customs clearance and transport) and tropical climates.

Looking at the other requirements of the guidelines, no labelling of DDs in a local language such as Swahili or English was reported by 27% of recipients in the religious sector, 21% in the public sector and 39% of the NGOs. A quality certificate was always or sometimes included in 11% of the public, 32.5% of the religious and 17.3% of NGO shipments. No organization received exclusively "unused drugs." The religious sector received a relatively high proportion of unused drugs (18%), which can be attributed to a high proportion of DDs given by individuals (Q 9). No difference was observed between the public sector and NGOs. The average of never receiving unused drugs was 66.2%. In Reich's study, every facility received unsolicited shipments of DDs including patient drug returns from abroad (unused drugs) (Reich 1999).

All questions about the quality of DDs had a high number of "no answer" and "I don't know" responses. This high rate might be explained by the administrative function of the recipient respondents. In the NGO sector, "no answer and I don't know" responses were sometimes nearly 40%.

In the meantime, the Tanzanian Pharmacy Board has established better quality control of drugs, including DDs, at all points of entry and covering all sectors (Kowero 2001).

Main Problems in the DD System

Problems reported by interviewees in the exploratory study (see above) were presented to the recipients as a list of possibilities, with the request to rate the various statements (Q 35). Multiple answers were possible. Of all recipients, 168 (84%) answered (Table 12).

The most frequently mentioned and apparently most relevant problem for all sectors was the fact that the quantity of DDs was not sufficient for long-term treatment (20%). This fact reveals the daily challenge to the Tanzanian healthcare system to cope with economic constraints and with the problems of sustainability in drug supply.

All the other problems varied from sector to sector. Non-relevance of DDs for local diseases was a main problem for the religious and public sectors (13%). This problem, together with the insufficient quantity of DDs, indicates that DDs persist in being more supply than demand driven. All other problems highlight problems of structure and process: the implementation of GDDs in the public and religious sectors, high shipment and custom fees for religious and non-governmental organizations, low transparency and insufficient communication between donor and recipient in the public sector, and insufficient infrastructure and training for NGOs. The quality of donated drugs was a minor problem in every sector. This can be explained by the pyramid of needs: As long as drugs are not available and affordable in the country, access to treatment is more important and the quality of donated drugs remains a minor issue.

Optimization of the DD System

To the open question "In your opinion, what are the most important actions needed to optimize drug donations?" 157 recipients (78%) answered, with 330 multiple answers (Figure 2). The question was not specifically analyzed by sector.

The most important suggestion of the recipients of DDs was to improve communication. Without good communication between donor and recipient, the supply of requested drugs cannot be improved, local needs are not met and transparency is not guaranteed. Even though drug quality

was not a major problem for recipients because drug availability was the more important issue, quality remains a very important factor in the supply chain. Quality can also be improved through communication and the distribution of GDDs (fourth suggestion).

All suggestions were a logical consequence of the main problems identified and were consistent with the core principles of the WHO GDDs: (a) maximum benefit of the recipients (meeting local needs), (b) respect of the wishes of the recipient (participatory approach), (c) no double standard in quality (quality aspects) and (d) effective communication between donor and recipient.

Table 12. Main problems with DDs in recipient organizations

Question	Answer	All Recipients	Public Sector	Religious Sector	NGOs
	Multiple Answers	*N* 588=100%	*N* 259=100%	*N* 275=100%	*N* 54=100%
35. What causes the main problems in the drug donation processes of your organization?	Quantities not sufficient for long-term treatment	19.6%	15.4%	23.6%	18.5%
	GDD and other tools not implemented	11.7%	14.3%	10.2%	7.4%
	Not relevant for local diseases	11.7%	12.7%	12.7%	1.9%
	Shipment and customs fees	10.5%	4.2%	16.4%	11.1%
	No transparency in DD processes	9.9%	14.7%	5.5%	9.3%
	No communication between donor and recipient	9.7%	14.3%	6.9%	1.9%
	Insufficient infrastructure	8.8%	7.7%	8.4%	16.7%
	Insufficient training	8.5%	8.5%	6.9%	16.7%
	Poor quality of DDs	5.8%	6.2%	5.5%	5.6%
	None	1.9%	1.2%	1.5%	7.4%
	Others	1.9%	0.8%	2.5%	3.7%

Limitations of the Study

One important consideration is that the study was done as a stakeholder analysis reflecting views rather than providing facts. Results represent the situation in 2001, but in the years up to 2005 there were no important changes concerning DDs or in Tanzanian DD policy. A further limitation lies in the distribution of the questionnaire to the heads of districts, dioceses and facilities who themselves selected the respondents (selection confounder). Additionally, this approach can only focus on the system as a whole and cannot provide detailed aspects of its inner structure. It is possible to assess differences between sectors, but it is difficult to obtain very detailed insight into single DD processes and to differentiate between different strategies for donating drugs. The outcome of processes of DDs at the patient level was not assessed.

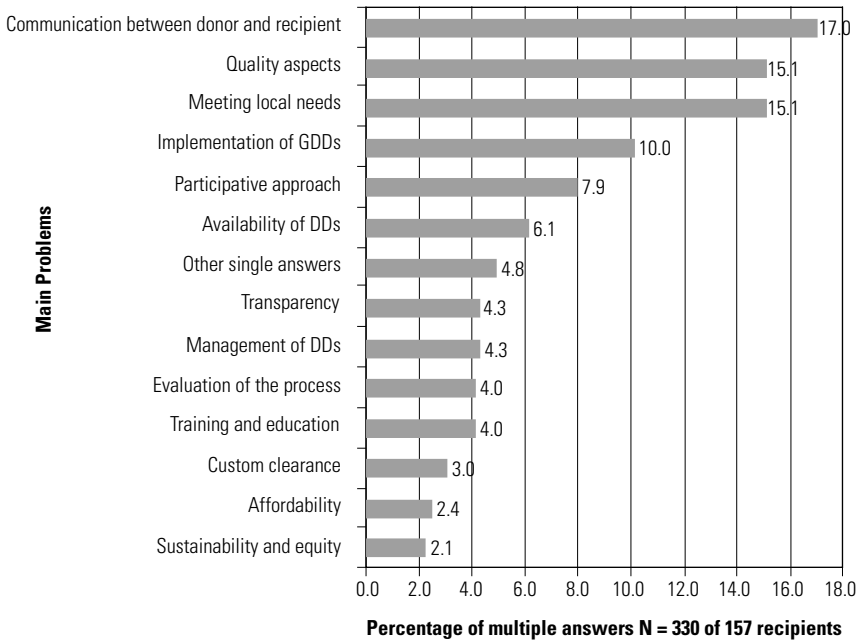
Conclusions

This descriptive study presents a first comprehensive analysis of stakeholders' perceptions and knowledge about the characteristics, structures and processes of in-kind DDs at a local level in Tanzania in 2001. The stakeholders' views cover the entire range of donation strategies: In-kind DDs given

directly to health facilities as well as DDs given as part of PPPs in the context of a program.

As in earlier published studies and reports, major contextual factors for DD systems in Tanzania were poverty, a resource-constraint economy, donor dependence as well as weak infrastructure. Consequently, in the eyes of stakeholders at every level of decision-making, including recipients and non-recipients, DDs were highly accepted for supporting the drug supply in a setting of poverty.

Figure 2. Optimization of drug donation processes (percentages of multiple answers, N 330)



An estimated average of 27% of the recipients' drug supply was covered by DDs. This important proportion of drug supply coverage is a relevant public health feature. Nevertheless, the prime concern of recipients of DDs was not drug quality, although quality assurance remained an ongoing concern, but the discrepancy between the recipients' needs and the donors' supply. DDs did not cover recipients' priority needs and their quantity was insufficient for sustainable treatment of patients and for continuous support to fill gaps in the access to essential drugs.

Other perceived problems varied among sectors and focused on drawbacks in structures and processes. The public sector requested more transparency in DD processes, which correlated with weaknesses in public structures as well as a lack of information and accountability. NGOs and religious facilities with better developed structures addressed problems such as shipment fees, insufficient infrastructure and training. These differences call for more collaboration of the private and public sectors and suggest that they could learn from each other, as recommended in the HSR.

Improved communication between recipients and donors was the major suggestion to render DD processes more effective. Donors should act in a transparent way, discuss with recipients any offer of DDs and respect recipients' needs. On the other hand, recipients were not always able to report clearly to donors what quantity of which drugs they actually needed. High numbers of "no answer" in the questionnaire highlight a lack of data, which makes useful quantification and selection of requested drugs very difficult. Recipients seemed to be disengaged from future involvement in reforming or planning drug supply, both of which are crucial for improving drug supply in general and DD processes in particular. The low response rate of recipients in charge of DDs reflected the

problem tackled in the HSR to better define responsibilities of the pharmaceutical sector within a pluralistic, decentralized healthcare delivery system.

Suggestions of recipients for optimizing DD processes corresponded fully with the principles of the Tanzanian and the WHO GDDs and called for broad distribution of the GDDs and their enforcement among donors and recipients. Finally, recipients should be empowered to apply and adhere to good DD practices while receiving continuing skills development in drug supply management.

List of abbreviations

CSSC = Christian Social Services Commission
Danida = Danish International Development Agency
DD = Drug Donation or donated drug
EDL = Essential Drug List
GDD = Guidelines for drug donations
GDP = Good Donation Practice
HSR = Health Sector Reform
MOH = Ministry of Health
MSD = Medical Store Department
NEDLIT = National Essential Drug List
NGO = Non-governmental Organization
NIMR = National Institute for Medical Research
PHC = Primary healthcare
PPP = Public/private partnership
PVO = Private voluntary organization
Q = Question or quest.
RDF = Revolving drug fund
SDC = Swiss Agency for Development Cooperation
SEAM = MSH Organization for Strategies to enhance Access to Essential Medicines
SWAp = Sector-wide approach
TFDA = Tanzanian Food and Drug Authority
UNICEF= United Nations Children's Fund
WHO = World Health Organization
WHO-GDDs = WHO Guidelines for Drug Donations

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