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Knowledge of clinical case management of IMNCI among trained and untrained primary health care personnel in two districts of province Punjab in Pakistan

University of Tampere
Medical School
Department of International Health
Health Sciences (International Health)
Master's Thesis
September 2009

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KHAN, RIZWAN: KNOWLEDGE OF CLINICAL CASE MANAGEMENT OF IMNCI AMONG TRAINED AND UNTRAINED PRIMARY HEALTH CARE PERSONNEL IN TWO DISTRICTS OF PROVINCE PUNJAB IN PAKISTAN
Master's Thesis, 62 pages, 2 appendices
Supervisor: Professor Per Ashorn
Health Sciences (International Health)
September 2009

Reduction in child and neonatal mortality is a major global health challenge. Pakistan, a developing country, occupies third highest place in the under five mortality rate (97/1000 live births) in Asia. To improve the child survival, government of Pakistan has adopted Integrated Management of Neonatal and Childhood Illness (IMNCI) strategy. Health care personnel have been trained for clinical case management of IMNCI but over the years slow progress has been noticed.

This study aimed to assess and compare the knowledge of clinical case management of IMNCI among trained and untrained first level rural health care staff of district Lahore and Sheikhupura in Pakistan. For the purpose, an anonymous questionnaire based cross-sectional survey with convienence sampling (response rate 75.2%) was conducted; 131 participants from Lahore and 136 from Sheikhupura were studied. Maximum possible score in the study questionnaire was 15. Mean knowledge score with 95% confidience intervals (CI) were calculated. Independent sample t-test and one way ANOVA test with Tukey's post-hoc contrast were used to analyze and compare the mean difference in knowledge score between the groups by training status and to test the hypothsis in the sample.

On knowledge scale, the trained personnel scored almost twice than untrained [9.7 vs 5.1; CI 4.6 (5.4, 3.7); p=<0.001]. Statistically significant knowledge score differences were noted among medical officers (p=<0.001), lady health visitors (p=0.001), and dispensers (p=0.02) depending upon their training status. Likewise, trained personnel working at Basic Health Units (p=<0.001) and Rural Health Centers (p=<0.001) scored significantly higher compared to untrained.

Training seemed to be associated with improved knowledge regarding clinical case management of IMNCI among first level rural health care staff. Future research may focus aspects of performance as better knowledge of case management alone may not be enough to improve child survival.

Key wards: IMNCI, Knowledge score, Trained, Untrained,

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ABBREVIATION

AIDS	Acquired Immunodeficiency Syndrome
AKHS	Agha Khan Health Services
ARI	Acute respiratory infection
BHU	Basic health unit
CDD	Control of diarrheal diseases
DOH	District officer health,
DSM	District support manager
EDO	Executive district officer health,
EPI	Expended program on immunization
FMT	Female medical technician
FP & PHC	Family planning and primary health care
IMCI	Integrated Management of Childhood Illness
IMNCI	Integrated Management of Neonatal and Childhood Illness
LBW	Low birth weight
LHV	Lady Health visitor
MCH	Maternal and child health
MDG-4	Fourth Millennium Development Goal
NMR	Neonatal mortality rate
ORS	Oral rehydration solution
PRSP	Punjab rural support program
RHC	Rural health centre
UNFPA	United Nations Population Fund
UNICEF	United Nations Children's Fund
US	United States
Vs	Verses
WHO	World Health Organization
WHO-EMRO	World Health Organization Regional Office for Eastern Mediterranean
WHO-AFRO	World Health Organization Regional Office for Africa

1. INTRODUCTION

Globally, close to 10 million children including 4 million neonates die each year (Nicoll, 2000, Black et al., 2003, Pariyo et al., 2005, Lawn et al., 2005, Fenn et al., 2007). Most of these preventable child deaths occur in low-income resource poor countries (Nicoll, 2000, Black et al., 2003, Pariyo et al., 2005, Fenn et al., 2007).

Pakistan, a low-income country, with consistently poor neonatal and child health indicators was ranked 43 among high child mortality countries (Government of Pakistan, 2009, Siddiqi et al., 2004, UNICEF Pakistan, 2009). Pakistan accounts for 7% of global neonatal deaths with neonatal mortality rate (NMR) of 57 per 1000 live births (UNICEF, 2008). In Asia, Pakistan was ranked third in the under-five mortality rate with 1100 deaths a day, more than six out of ten were in neonatal period (UNICEF Pakistan, 2008). Under-five mortality per 1000 live births in Pakistan was 130 in year 1990, 97 in year 2006 and 99 in year 2008 respectively (UNICEF, 2008, US Census bureau, 2008). Likewise, infant mortality per 1000 live births was 100 in 1990, 78 in 2006 and 75 during the year 2008 respectively (UNICEF, 2008, Population council, 2008, Population Reference Bureau, 2008). Consistent high child mortality figures indicate a little progress towards neonatal and child survival (Bhutta, 2000, Siddiqi et al., 2004).

Reduction in child and neonatal mortality are major public and global health challenges (Arrive et al., 2004). The Fourth Millennium Development Goal (MDG-4) represents commitment to reduce mortality in children younger than 5 years by two-third between 1990 and 2015 (Sachs et al.,2005, Haines et al, 2004, MDGMONITOR, 2009). In-put of efforts, between 1960 and 2000, resulted in reduction in child mortality (from month 2 to age 5 years); unfortunately, the neonatal mortality rate (NMR) could not be reduced desirably (Ahmad et al., 2000, Lawn et al., 2005). To meet MDG-4, a substantial reduction in child mortality especially neonatal mortality (38% of all deaths in children less than five) in high-mortality countries is needed (Fenn et al., 2007, Martines et al., 2005, Lawn et al., 2005). Major reductions in under-five mortality could be achieved

through provision of individualized clinical care, especially for neonates (Martines et al., 2005, Lawn et al., 2005, MacFarlane et al., 1999).

WHO and UNICEF launched Integrated Management of Childhood Illness (IMCI) strategy during 1992 followed by IMNCI strategy to improve child and neonatal survival through provision of individualized care (Tulloch, 1999, Pariyo et al., 2005, Amaral et al., 2005, Nicoll, 2000, WHO, 2008, UNICEF, 2008). Since 1998, Government of Pakistan has adopted these strategies as National guidelines (WHO-EMRO, 2008). Health care staff, especially serving in first level rural health care sector has been trained for clinical case management of IMNCI but little has changed for child health in Pakistan (WHO-EMRO, 2008, Bhutta, 2000, Siddiqi et al., 2004).

This questionnaire survey, between first level rural health care staff, was done to compare and describe knowledge of non-trainees and the follow up knowledge of the trainees regarding clinical case management of IMNCI in district Lahore and Sheikhupura in province Punjab of Pakistan. This study indirectly assessed the effect of IMNCI training in the improvement of knowledge of health care personnel.

2. LITERATURE REVIEW: IMNCI, Neonatal and Child Health

This study focuses neonatal and child health and survival which is a major global and public health challenge. Neonatal and child health is a broad subject and this particular study revolves around clinical case management of IMNCI. For this reason, this review touches global child mortality, contributors of mortality, interventions to reduce mortality, efforts made for mortality reduction and role of IMNCI strategy in this context.

In this review, initially global burden and distribution of neonatal and child deaths is given which follows risk factors, cause specific mortalities in children and how this mortality can be reduced? Then global commitments to decrease child mortality, steps taken for the purpose, achievements in this regard and constrains faced are given. Then available interventions to tackle under-five mortality in high mortality countries are discussed and possible role IMNCI strategy in improving child survival is given. In the end neonatal and child mortality with reference to Pakistan are touched and IMNCI strategy in Pakistani context is reviewed.

This unsystematic literature review is based on a literature search from the Pub Med, Google scholars and Google search engines to find relevant articles on neonatal and child health. The literature found most relevant is then used for this review. Relevant publications and reports of the World Health Organization, UNICEF, World Bank and other agencies of the United Nations are also taken into account.

2.1 Global burden of neonatal and child deaths

Neonatal and child deaths constitute a major burden worldwide. There are marked geographical variations in death rates and causes of mortality, overall and at specific sites. Validity of child mortality figures depend largely on good quality data on births, deaths and cause of death, which is generally lacking in high mortality low-income

countries. For this reason, most of the mortality figures from poor countries are mere estimations.

Today the world is facing challenge of decreasing about 10 million annual child deaths that are preventable and mostly occurring in low-income countries (Black et al., 2003, Bryce et al., 2003, Jones et al., 2003, Pariyo et al., 2005). This risk of dying before completing 60 months of life is 13 times higher in low-income countries compared to high-income countries (United Nations, 2008). Approximately 90% of global burden of child mortality goes to 42 countries and 50% of under-five deaths are occurring in only six countries (Black et al., 2003, Bryce et al., 2003). The burden of child mortality is highest in Sub-Saharan Africa (41% of global child deaths) followed by South Asia (34% of global child deaths) (Black et al., 2003, United Nations, 2008). Child mortality rates are nearly four folds higher in Latin America, Eastern Asia and Caribbean compared to industrialized countries (United Nations, 2008).

Every year, out of 130 million newborns, about 4 million babies die (38% of global child deaths) during first 28 days of life (the neonatal period) (Darmstadt et al., 2005, Knippenberg, 2005, Lawn et al., 2005, United Nations, 2008, Zupan et al., 2005). The number of stillborns (intra-uterine death during the last 3 months of pregnancy) is also quite high (Lawn et al., 2005, Siddiqi et al., 2004). First week of life is the most vulnerable period; on the first day of life, risk of death is highest and three-quarters of neonatal deaths occur in first week of life (Lawn et al., 2005, Siddiqi et al., 2004). About 99% of these neonatal deaths occur in low and middle income countries, mostly at home (Darmstadt et al., 2005, Knippenberg, 2005, Lawn et al., 2005). Here again, Sub-Saharan Africa has the highest rates of neonatal mortality and highest numbers of deaths are occurring in south-central Asian countries (Knippenberg, 2005, Lawn et al., 2005).

Globally, there are considerable regional and inter-country variations in neonatal and child mortality (Amaral et al., 2005, Black et al., 2003, International institute for population sciences, 2000). As for example, in 1990 Sub-Saharan Africa had 20 times higher child mortality compared to high income developed countries (180 vs. 9 per 1000

live births) which increased further in year 2000 to 29 folds (175 vs. 6 per 1000 live births) (Lawn et al., 2005, UNICEF, 2001a). In high child mortality countries, about 20% deaths are neonatal deaths; on the other hand neonatal deaths are much higher (50%) in countries where child mortality is about 35 deaths per 1000 live births (Black et al., 2003).

In the late 20th century, considerable reductions in global child mortality were achieved in low income and middle-income countries as well as in low and high mortality regions (Ahmad et al., 2000, Black et al., 2003, WHO, 2002). However, Sub-Saharan Africa is far behind in child survival (Ahmad et al., 2000, Black et al., 2003, Hill et al., 1999, Childinfo, 2009, United Nations Population Division, 2001). Despite 50% mortality reduction in South Asia, almost every tenth child is still dying before fifth birthday (Ahmad et al., 2000, Black et al., 2003, Hill et al., 1999, Childinfo, 2009, United Nations Population Division, 2001)

Unfortunately, the call for reduction in global child mortality below 70 per 1000 live births, by the World Summit for children in 1990 could not be met because health systems were not strong and child survival interventions were inadequate (Black et al., 2003, UNICEF, 2001a). By 1990, only five countries reached the target of child mortality reduction out of fifty-five (Black et al., 2003, UNICEF, 2001a). In Sub-Saharan Africa, average rates of child mortality have fallen from 184 per 1000 live births in 1990, to 167 in 2000 and 157 in 2006. Likewise, in South Asia rates have fallen from 120 in 1990, to 94 and 81 during year 2000 and 2006 respectively, indicating little progress in these regions (United Nations, 2008).

2.2 Risk factors associated with child mortality

Globally, child death has spatial variations and different determinants act at different levels to cause this mortality (International institute for population sciences, 2000, Mosely et al., 1984). Researchers have recognized increasing poverty, residence in rural areas or urban slums, unhygienic and unsafe environment, unsafe water intake,

inadequate sanitation facilitates, over crowding, birth spacing and paternal educational status as risk factors for child mortality (African Population and Health Research Center, 2002, Black et al., 2003, Ezzati et al., 2002, Setty-Venugopal et al., 2002, WHO, 2002). Demographers have claimed that high infant and child mortality and poverty are complimentary to each other (Martin et al., 1983, Mosley et al., 1984). Mortality rates are much higher for children from rural and poor background. It is also high where mothers lack a basic education (United Nations, 2008). Additionally, complicated deliveries and low birth weight are associated with higher risk of neonatal mortality (Lawn et al., 2005).

Breast-feeding has a key role in promoting child survival; risk of death from diarrhea and pneumonia increases 7-fold and 5-fold respectively among non-breastfed neonates and young infants compared to exclusively breastfed (Black et al., 2003, Victora et al., 1989). This risk is two-folds higher in non-exclusive breastfed compared to exclusive ones (Arifeen et al., 2001, Black et al., 2003, Ross et al., 2005). Case is not very much different among older non-breastfed infants (Black et al., 2003, WHO collaborative study team, 2000).

Under-nutrition is a co-factor of under-five mortality in about one-third of all deaths in children especially the poor (United Nations, 2008, WHO-AFRO., 2005). Approximately 53% of all child deaths could be attributable to childhood malnutrition and micronutrient deficiencies (Black et al., 2003, Mosley et al., 1984). Malnourished status, Vitamin-A and Zinc deficiency increases risk of death due to infections for example diarrhea, malaria, pneumonia and measles (Caulfield et al., 2004, Rice et al., 2004, Zaidi et al., 2004). Poorer the nutritional status greater the risk of mortality among children; mild underweight status is associated with 2-times where as moderate to severe malnourished status is associated with 5-8 times higher risk of death compared to well nourished (Black et al., 2003, Fishman et al., 2004).

Co-morbidities in child deaths do exist that are more dangerous and increase child mortality. These co-morbidities are more frequent in resource poor countries.

Malnourished status and infectious diseases have a synergistic effect on child mortality (Black et al., 2003, Fishman et al., 2004, Pelletier et al., 1993). Co-occurrence of two or more infections, due to common host predisposing factors, also makes children more vulnerable to death (Black et al., 2003).

2.3 Specific causes of neonatal and child mortality

According to WHO estimates for year 2000, global distribution of burden of cause specific under-five mortality is attributable to diarrhea (13%), pneumonia (19%), Malaria (9%), Measles (5%), AIDS (3%), neonatal diseases (42%) and miscellaneous causes (9%) (Black et al., 2003, Mathers et al., 2002). For neonatal deaths, it is further estimated that 28% are attributable to complications of pre-maturity, 26% to severe infections, 23% to birth asphyxia, and 7% to tetanus (Jones et al., 2003, Lawn et al., 2005, Save the Children, 2001).

2.4 Ways to reduce child mortality

Setty-Venugopal et al identified factors acting before and after birth that affect child survival. He claimed that prevention and management of acute respiratory infections, diarrheal diseases, vaccination and improved nutrition could directly improve child survival. He was of the view that reduction in maternal mortality and adequate birth spacing are indirectly associated better child survival. He claimed that birth spacing of less than three years is associated with 26-51% increased risk of under-five death. Birth spacing is further associated with better child nutritional status, 36-41 months spacing decreases risk of under-nutrition by 28-29% and thus improves survival (Setty-Venugopal et al, 2002).

2.5 Global commitment to improve child survival

The Millennium Declaration, pledged unanimously by the global community, emphasizes the input of resources and efforts towards the global poverty reduction,

health, and sustainability issues. The Millennium Development Goals thus adopted set targets to be achieved by 2015 and use socioeconomic, environmental, nutritional, and health indicators to monitor progress in this regard (Gakidou et al., 2007, Lambrechts et al., 2005, Sachs et al., 2005, Travis et al., 2004, United Nations, 2001, United Nations, 2008).

Specifically, the fourth Millennium Development Goal represents the global commitment to reduce under-five child mortality by two-thirds by the year 2015 compared to the year 1990 (Ahmad et al., 2000, Haines et al., 2004, United Nations, 2001, United Nations, 2008).

2.6 Achievements and constrains in child survival

According to the Millennium Development Goals Report 2008, for the first time under-five child deaths dropped below 10 million during the year 2006 (United Nations, 2008). The assessment of Countdown Coverage Writing Group in 68 highest child mortality countries revealed that only 16 countries were on the way to achieve MDG-4 (Bryce et al., 2008). Bangladesh, a country on track for child survival, has successfully achieved decline in child mortality after first month of life (El Arifeen, 2008). About 27 countries, including most of sub-Saharan African countries, made no progress in reducing childhood deaths between 1990 and 2006 (United Nations, 2008).

Today, the risk factors and causes of death are not very much different from 1990s and are easily preventable through improvements in primary health care system and universal delivery of affordable and effective interventions (Bryce et al., 2003, United Nations, 2008).

Multi-country evaluation identified existence of inequalities in coverage of proven interventions within and between countries (Boerma et al., 2008, Bryce et al., 2008, Victoria et al., 2005). In many countries, in spite of high coverage rates of breastfeeding and measles vaccine like interventions, coverage of *Haemophilus influenza* type b

vaccine and insecticide-treated net was found very low (Jones et al., 2003). There are reports mentioning that child survival and safe motherhood strategies failed to address preventable neonatal deaths, adequately (Lawn et al., 2005). Persistent high child mortality further testifies that available interventions are not reaching to those who need them especially the poor (Jones et al., 2003, Victora et al., 2003).

In order to achieve the targets of MDG-4, it is extremely important to assess epidemiological landscape of a country (Black et al., 2003). Understanding of determinants of child health acting at different levels is also mandatory (Black et al., 2003, Mosely et al., 1984). Such pre-evaluations may help in developing and implementing appropriate public health interventions (Black et al., 2003).

Universal coverage of proven neonatal and child health interventions is the key to success for achieving MDG-4 (Borema et al; 2008). Multi-country analysis (54 countries) found an overall gap of 20-70% in delivery of key interventions in study countries. Study also found large inter-country differences among poor (54%) and rich (29%) and these were even wider for neonatal care interventions. Of 54, 40 countries succeeded in decreasing the coverage gap to some extent and Nepal, Cambodia and Mozambique have shown relatively good progress. Study concluded that existing wide gaps between and with in countries need doubling the intervention coverage efforts in most countries and steadier fall can be expected for such inter-country gaps (Borema et al., 2008).

Neonatal survival steering team is of the view that affordable and proven interventions are available but have not been incorporated in child survival programs. They further recommend the need to strengthen safe motherhood and child health programs through universal availability of skilled care at childbirth and involvement of family and community for better home care to reduce neonatal mortality (Martines et al., 2005). It is also worrisome that in spite of larger mortality burden, allocations for neonatal and child health are not sufficient, and larger investments are still required to achieve 90% coverage of selected interventions (Martines et al., 2005).

It has been found that poorest are most at risk of not getting neonatal and child health interventions (El Arifeen, 2008, Victora et al., 2005). In an eight-country survey, Fenn at al found that in seven of eight countries inequities in coverage for neonatal interventions were evident and poorest were the most vulnerable. Reductions in child mortality seemed difficult to be realized without overcoming such equity issues (Fenn et al., 2007). Furthermore, if the new interventions to be deployed then there is a strong possibility that existing inequity may hinder its benefits for the population in need (Victora et al., 2005).

United States maternal and child health bureau further suggested that well organized first level care preventive services and better inter-related interventions across all groups might confirm improved outcome for children (Margolis et al., 2001).

Thus to reduce neonatal mortality and child mortality, equity and equality approach should be adopted in all steps from designing to evaluation of interventions (Fenn et al., 2007). To improve child health, delivery of preventive and treatment interventions at mass level is also mandatory (Jones et al., 2003). Considering the need to combine different vertical programs (for example control of diarrheal diseases, control of acute respiratory infection, expanded program on immunization, breast-feeding) for child health into one IMNCI like strategy was needed.

Successful experiences gained from effective child health interventions (for example immunization, oral rehydration therapy, management of acute respiratory infections and improved infant feeding) helped in devising Integrated Management of Childhood Illness (IMCI) strategy (Patwari et al., 2002).

2.7 IMNCI strategy - Role in reducing child mortality

2.7.1 IMNCI strategy:

To respond and tackle major child health problems in resource poor countries, during the 1990s, the World Health Organization and its collaborators launched the Integrated Management of Childhood Illness (IMCI) strategy (Amaral et al., 2005, Arrive et al., 2004, Gove, 1997, Armstrong et al., 2004a, Armstrong et al., 2004b). Due to high neonatal mortality in some countries, the strategy was reviewed to include neonatal health. The reviewed strategy was called Integrated Management of Neonatal and Childhood Illness (IMNCI) strategy (Ministry of Health and Family Welfare India, 2008). Over 80 countries have implemented IMCI strategy by 2001 (Armstrong et al., 2004b, Patwari et al 2002).

The IMCI strategy aims to reduce death, illness and disability by using a set of interventions for the integrated treatment and prevention of major childhood killers (Patwari et al., 2002).

Studies have shown that co-morbidities and co-occurrence of diseases exist (Armstrong et al., 2004b, Black et al., 2003), children presenting to health care system with any illness often suffer from more than one disease. The integrated clinical approach ensures that a child must be managed as a whole in both treatment and prevention perspective and all relevant needs of the child will be taken into account during the contact of the child with the health facility or health care provider (Ministry of Health and Family Welfare India, 2008). In outpatient health facilities, the IMCI strategy promotes the accurate diagnosis of childhood illness, ensures appropriate treatment for all major illnesses, strengthens the counseling of caregivers and the provision of preventive services, and ensuring timely referral of severely ill children (Patwari et al., 2002). In the home setting, this strategy promotes appropriate early home care and care-seeking, improved nutrition and prevention (Patwari et al., 2002).

To better serve the children, a comprehensive three-pronged IMNCI strategy has been devised. Improving clinical case management skills of health care personnel, strengthening of health care delivery system for effective management of childhood illness and promoting key family-community practices through counseling and increasing awareness are key components of this strategy (Ministry of Health and Family Welfare India, 2008, Pariyo et al., 2005, Tulloch, 1999, WHO, 1997a, WHO, 2005, Patwari et al., 2002). Proper planning of program, selection of indicators, setting of targets and good evaluation are prerequisite for adequate implementation of this strategy (WHO, 1997a). Effective implementation of all components of IMNCI are needed to achieve the targets of neonatal and child survival (Ministry of Health and Family Welfare India, 2008). IMCI strategy has a potential to improve the care in a cost-effective way (Rowe et al., 1999, WHO, 1997b). This promising strategy rightly focuses major contributors of child death including acute respiratory infections, diarrhea, measles, malaria and malnutrition (Lulseged., 2002, WHO, 2003, Armstrong et al., 2004b, Patwari et al., 2002). Nearly 70% of annual global child deaths and every three out of four sick children seeking for care in developing countries are due to one of these five killers often in combination (Lulseged, 2002, UNICEF, 2001). Strategy also covers aspects of immunization, disease prevention and health promotion in addition to early detection and timely management of common childhood illnesses (WHO, 2003). It also addresses improved infant and child nutrition including breastfeeding (Patwari et al., 2002).

Clinical case management of IMNCI, one of the components of IMNCI strategy, is skill-based training of health care professionals to train them for tackling common childhood illnesses (Ministry of Health and Family Welfare India, 2008). It is a participatory training including classroom sessions with clinical sessions in facility and community settings to better train all in-service professionals (Ministry of Health and Family Welfare India, 2008).

It is important to appreciate that most of the promising interventions of clinical case management of IMNCI are to be delivered at the first level care and family-community

level that obviously do not require much extra input and avoid duplication of resources (WHO, 1997a, Patwari et al., 2002).

Thus, there is dire need to implement IMCI guidelines in order to improve the quality of child health care at lower cost by involving family and communities in high mortality and resource poor countries.

2.7.2 Role IMNCI strategy can play in child survival

The World Development Report acknowledges that interventions to manage sick child most likely reduce major burden of global child ill health (World Bank, 1993). IMNCI approach expected to reduce 14% of burden in low-income countries if adequate coverage can be achieved and maintained (World Bank, 1993, Armstrong et al., 2004b). IMCI is one of the most affordable child health interventions for both low and middle-income countries (World Bank, 1993, Patwari et al., 2002). Several indirect indicators endorse its validity as a comprehensive and effective strategy (Patwari et al., 2002).

Jones et al claimed many preventive and treatment interventions if delivered to 90-99% of children could remarkably reduce mortality (Jones et al., 2003). Most of the interventions discussed by Jones are already included in IMNCI strategy. Jones et al further claimed that preventive, promotional, nutritional, treatment and vaccination interventions of IMNCI case-management strategy has the potential of saving most of the children; effective nutritional intervention and management with breastfeeding, complementary feeding, vitamin A, and zinc supplementation may save 2·4 million child deaths each year (25% of total annual deaths) (Jones et al., 2003). Further 3.2 million children (33% of annual total deaths) could benefit every year from effective and integrated case management of childhood infections (diarrhea and dysentery, pneumonia, malaria, and neonatal sepsis) (Jones et al., 2003). Therefore, we can safely assume that clinical case management of IMNCI strategy has the potential of reducing more than half of the global child deaths.

However, it seems that MDG-4 will be a hard target to realize in the absence of conjunction of strategies like safe motherhood, neonatal survival and other child survival strategies with IMCI strategy (Lambrechts et al., 2005). To achieve the set targets, health system reforms and family community components of the strategy should be address (Patwari et al., 2002).

2.8 Neonatal and child health in Pakistan

Over the years, little has changed for child survival in Pakistan (Siddiqi et al., 2004). Health planners, somehow, have neglected child health in Pakistan (Siddiqi et al., 2004). Under-five mortality remained unacceptably high (Siddiqi et al., 2004). In Pakistan, every year 700,000 children die including about 400000 infants (less than one year of age) (Siddiqi et al., 2004, UNICEF, 2001). Infant mortality rates reported to be higher than regional south Asian countries (84/1000 live birth) and about 50% of these deaths occur in the first month of life (Siddiqi et al., 2004, UNICEF, 1996, UNICEF, 2001). Most of these neonatal deaths happen within 7 days of birth and stillbirths account for one to two quarter of this mortality (Siddiqi et al., 2004). Pakistan is ranked 43 among high child mortality countries (UNICEF Pakistan, 2009). Pakistan accounts for 7% of global neonatal deaths with neonatal mortality rate (NMR) of 57 per 1000 live births (UNICEF, 2008). In Asia, Pakistan was ranked third in the under-five mortality rate with 1100 deaths a day, more than six out of ten are in neonatal period (UNICEF Pakistan, 2008). Under-five mortality per 1000 live births in Pakistan was 130 in year 1990, 97 in year 2006 and 99 in year 2008 respectively (UNICEF, 2008, US Census bureau, 2008). Likewise, infant mortality per 1000 live births was 100 in 1990, 78 in 2006 and 75 during the year 2008 respectively (Population council, 2008, Population Reference Bureau, 2008, UNICEF, 2008). These figures indicate that Pakistan is far away from millennium development target that is 47 for under-five mortality and 40 for infant mortality (Siddiqi et al., 2004). Over 50% of this disease burden is attributable to preventable or treatable communicable diseases including major killers like measles, malnutrition, respiratory tract infection, diarrhea and other vaccine preventable diseases (Lulseged, 2002, Siddiqi et al., 2004, WHO, 2003).

Gaps in child survival in Pakistan as recognized by Siddiqi et al are ineffective or absent nutritional programs (one-fourth newborns are low birth weight, 33-45% under-five children are under-weight), less focus on neonatal and perinatal mortality, poor emergency obstetric services, unavailability of skilled birth attendants and un-clear IMCI policy (Siddiqi et al., 2004).

2.9 IMCI / IMNCI strategy in Pakistan

2.9.1 Implementation

Earlier, implementation of IMCI in high mortality resource poor African countries endorsed its validity as a comprehensive and effective strategy (Lambrechts et al., 1999, Patwari et al., 2002). In Pakistan, the IMCI strategy has been jointly launched by the WHO/ UNICEF in close liaison with the Ministry of Health during 1998. The aim was to improve childcare at primary care facilities and in the communities. In Pakistan IMCI, strategy has been modified to include the neonatal period. Early implementation phase was started in 1999 and since 2003; the strategy has extended its roots. Eleven-day trainings have been conducted for Paediatricians, medical officers and paramedics (lady health visitors, nurses, health technicians and dispensers) in the IMCI-implementing districts. Additional 5-day facilitator trainings have been conducted for medical officers to have a pool of facilitators in districts. Both English and Urdu versions of training material were designed. Trainings were conducted using same material for all participants. To date, all provinces and federally administered areas have at least one health facility with trained staff. By 2008, only 49 of 125 districts were implementing IMCI and only 9.3% health facilities had at least one health care provider trained in IMCI. About 91% facilities still to implement IMCI. During 4 year period (2005-2008), 57 training courses have been conducted. Since year 2000, 1344 health care personnel have been trained (WHO-EMRO, 2008)

It is promising that in Pakistan non-governmental organizations and private organizations are actively sharing hands with the state in IMCI/IMNCI program implementation.

2.9.2 Achievements

Few studies have been conducted in Pakistan regarding IMCI / IMNCI. In December 2000 and July 2001 during the IMCI pilot, trainees from two districts (Multan and Abbotabad) of Pakistan were assessed. Follow-up assessments results were encouraging and it was concluded that training improved performance of health care provider (UNFPA, 1999, WHO-EMRO, 2008). In a workshop conducted by the Agha Khan Health Services (AKHS) Program in Karachi health workers, doctors and other health staff were trained for clinical case management of IMCI. IMCI implementation by these trained personnel at field sites showed positive results (UNFPA, 1999). Furthermore, implementation of IMCI guidelines in two low-income settings of Pakistan also changed practices of private providers (Luby et al., 2002).

2.9.3 The way forward:

Based on overall health care system performance, Pakistan was ranked 122 among 191 countries and health system reform may help in improving the child survival (Asian Development Bank, 1999). Strengthening of health care system is one of the components of IMCI strategy and necessary to improve the efficiency of health care system (Asian Development Bank, 1999). There are constraints in implementation and expansion but they are inherent in the system and are not specific to IMCI. To make this approach workable a degree of innovation and flexibility throughout the existing child health services is needed. Strengthening community participation component of IMCI may improve childcare practices, promote care-seeking behavior and may result in increased utilization of the health facilities. Efforts should be made to bring the advantages of IMCI to the attention of all stakeholders. There also is need to develop capacity building for doctors, paramedics and community health workers in the districts.

Sincere efforts and commitment from Government as well as from other stakeholders are needed for success.

Universal implementation of IMNCI strategy in Pakistan may result in reformation of polices for better case management of sick children especially neonates, complimentary feeding and breast-feeding counseling, micronutrient supplementation and vaccination. IMCI should be introduced in all communities and personnel should be trained. Cost-effectiveness of IMCI strategy must be documented with local data. Better evaluation indicators, integrated monitoring and supervisory tools should be implied and periodic evaluation of IMCI activities should be performed for better future planning. All components of IMNCI strategy should be addressed appropriately.

2.10 Why this study was needed?

IMCI / IMNCI strategy was launched to improve child and neonatal survival through provision of individualized care (Amaral et al., 2005, Nicoll, 2000, Pariyo et al., 2005, Tulloch, 1999, UNICEF, 2008, WHO, 2008). Government of Pakistan adopted this strategy in 1998 (WHO-EMRO, 2008). Health care staff, especially serving in first level rural health care sector has been trained for clinical case management of IMNCI but little has changed for child health in Pakistan (Bhutta, 2000, WHO-EMRO, 2008, Siddiqi et al., 2004).

This questionnaire survey, between primary health care staff, was needed to compare and describe knowledge of non-trainees and the follow up knowledge of the trainees regarding clinical case management of IMNCI in district Lahore and Sheikhupura in province Punjab of Pakistan. This study was an attempt to assess the effect of IMNCI training in the improvement of knowledge of health care personnel.

3. OBJECTIVES OF THE STUDY

The overall aim of the research was to better identify the shortcomings (gaps) regarding neonatal and child care and develop/propose strategies that enhance better outcome for neonates and children. The present research especially aimed to explore knowledge among the trainees of clinical case management of Integrated Management of Neonatal and Childhood Illness (IMNCI) and non-trainees (rural health care staff i.e. medical officers, lady health visitors and dispensers working at basic health units and rural health centers) in district Lahore and Sheikhupura of province Punjab, Pakistan.

Specifically, the objectives of this study were as follows:

- To compare the knowledge of clinical case management of IMNCI between trained and untrained rural health care staff.

- To compare the knowledge of clinical case management of IMNCI between staff of rural health centers (RHC) and basic health units (BHU) by training status.

- To compare the knowledge of clinical case management of IMNCI between doctors, lady health visitors and dispensers by training status

- To compare the knowledge of clinical case management of IMNCI in individual questions between the groups by training status

4. METHODS

This was a self-administered anonymous questionnaire based cross-sectional comparative study done with convenience sampling. Study was based on the data collected during June and August 2008 in two districts, Lahore and Sheikhupura, of province Punjab in Pakistan.

4.1 Study districts and health care facilities

District Lahore is the second most populous district of Pakistan (map available as Appendix-I). It has an area of 1772 square kilometers and an estimated population of about 9 million (Punjab gateway, 2009a, Punjab police, 2008a). Sheikhupura (map available as Appendix-I), a neighboring district, has an area of 3280 square kilometers and population of about 2.6 million (Punjab gateway, 2009b, Punjab police, 2008b). Each district has a state owned network of first level health care facilities that include Basic Health Units (BHU's) and Rural Health Centers (RHC's). Higher level of health facilities do exist in both districts (WHO-EMRO, 2007). In both districts, child health services are mainly provided by State-sector although private sector is also operative.

A Basic Health Unit usually serves a population of about 10,000–20,000. Each has a staff of 10 people consisting of a medical doctor, a lady health visitor (LHV) or a female medical technician (FMT), a Male Medical Technician and/or a dispenser, other paramedical staff and helping staff. BHU's offer first level curative, maternal and child health (MCH), family planning, immunization and preventive services. All BHU's provide health care services during daytime (8 a.m. to 3 p.m.) (WHO-EMRO, 2007). On the other hand, a Rural Health Center serves a population of about 50,000 to 100,000. Each has a staff of 30 including two male medical officers, one female medical officer, one dental surgeon, paramedical and helping staff. RHC generally has 10-20 in-patient beds, x-ray, pathology laboratory and minor surgical facilities. All RHC's are responsible for round the clock health care services (WHO-EMRO, 2007).

Every basic health unit and rural health centre is responsible for providing primary care and treatment to all sick neonates, infants and children. They take care of neonates and children irrespective of primary diagnosis and provide them available treatment. They then refer, if needed, the cases to the higher hierarchal hospital for further management (WHO-EMRO, 2007).

There were 37 basic health units and 6 rural health centers in district Lahore where as district Sheikhupura had 65 basic health units and 7 rural health centers. The districts were chosen for survey because in district Sheikhupura health care personnel have been trained for clinical case management of IMNCI. No such trainings have been provided in district Lahore. This study offered the advantage of comparative survey among trained and untrained first level rural health care personnel in the two study districts.

4.2 Study questionnaire

A structured questionnaire, in English, developed and pre-tested by National program for Family Planning and Primary Health Care (FP & PHC) in province Punjab of Pakistan for assessment of trainees after the clinical case management of IMNCI training course was used as study tool (Appendix-II). The same English version of questionnaire was used in this survey with little modification in few questions to make them clearer and easily understandable. Need based translation of few questions into national language Urdu was made for dispensers and lady health visitors. This was done during the survey and communicated verbally. The questionnaire consisted of three parts. First part included information for study participants and contact details of researchers (Appendix-IIa). Second part included 14 questions to extract base line information about the participants (Appendix-IIb). Third part consisted of 15 questions to assess their knowledge about clinical case management of IMNCI (Appendix-IIc). All participants answered second and third part of the questionnaire (Appendix-IIb and IIc) in the blank space provided for participants to answer. On an average questionnaire took 20-30 minutes to fill in. Each question in the third part carried maximum one score

(ranged from 0 to 1) (Appendix-IIc) and an individual final score (ranged from 0 to 15) was allocated to each participant based on the performance in the questionnaire.

The study questionnaire assessed knowledge about danger signs, respiratory problems, diarrhea and worm infestation, immunization, nutrition and breast-feeding, and safe remedy in children up to five years of age as these are common contributors of mortality and morbidity in children. For the purpose of analysis, each question was assigned to one of the six groups for example danger signs, respiratory problems, diarrhea and worm infestation, immunization, nutrition and breast-feeding and miscellaneous questions.

4.3 Study population and sample size

In both study districts, usual allocation at each BHU included a medical doctor, a LHV or a FMT and a Male Medical Technician or/and a dispenser. On the other hand, at each RHC 1-3 medical officers, 1-3 dispensers and 1-3 lady health visitors was a usual allocation. Therefore, the intended target population included 423 health care personnel posted and serving as medical officers, dispensers and lady health visitors at first level rural health in the study districts during the study period from June to August 2008.

In total, 387 eligible participants were identified and approached, irrespective of their participation in clinical case management of INMCI training. Unfortunately, 36 personnel could not be included due to reasons of vacant seats, involved in other official assignment, on leave or absent on the day of study visit or posting elsewhere on current charge basis during study period.

In this study, health care personnel were recognized as from Lahore or Sheikhupura based on their place of posting and service at the time of study. Participants were classified as trained and untrained based on clinical case management of IMNCI training status. Participants were further classified from BHU or RHC based on the level of health care facility they were serving. In this study, medical officers were defined as

having five years bachelors' or higher degree in Medicine, lady health visitor as having two-year diploma and dispensers as having one-year diploma in the relevant discipline.

For the purpose of analysis, the study population was broadly categorized into two, those who reported having gone through clinical case management of IMNCI training and those who reported having no training.

4.4 Survey

The survey was carried out by a research team, consisting of a principal researcher and an assistant researcher between June to August 2008. In this survey, information was obtained by means of self-administered anonymous questionnaires. Every eligible participant was asked to participate. In district Sheikhupura, all medical officers and lady health visitors serving at BHU's were recruited on the day of their respective monthly meeting with Executive District Officer (EDO) Health and/or District Officer Health (DOH). In district Lahore, recruitment of medical officers and lady health visitors serving at BHU's was done during monthly meeting with District Support Manager (DSM) Punjab Rural Support Program (PRSP) Lahore. Special meetings were arranged in EDO and DSM office for dispensers serving at BHU's to conduct survey in both the districts. Each Rural health center in both districts was visited in person by the research team and whole day was spent there to conduct the survey. Health care personnel who were not present during the study visit days, irrespective of reason, were excluded from study.

4.5 Covariates in analysis

Clinical case management of IMNCI training status was the main variable. Other covariates that were included in the analysis were district of appointment and service, level of health care facility, designation, gender, year of training, service duration in rural health care sector, working experience in children ward of a hospital. For convenience of analysis, training year was taken into account and working experience in

Children ward was categorized as less than 6 months, 6-12 months and more than 12 months. Duration of training was not included in the analysis as to the information of principal researcher all trainings were of 11 days where as the reported days were 10-15 days. It is pertinent to mention that refresher course attendance was not included in analysis as to the information of principal researcher no refresher course has been offered so far.

4.6 Statistical analysis

One EXCEL data base file was created. Principal researcher carried out double data entry. The two versions were compared and discrepancies resolved with reference to original questionnaire data. Analysis was done with statistical software R version 2.8.1 (r -project.org, 2008).

The analysis was started by comparing general characteristics of the study population. A descriptive analysis was made between the respondents from both districts in order to examine the background characteristics of health care personnel. Then, calculated how many percent of the health care personnel were trained for clinical case management of IMNCI, to which district they belong and what was their gender and designation. Further calculations were made to know how many years have they served rural sector, when they were trained, how many of them served as facilitators and how many have worked in children ward of a hospital.

In the second step, initially overall mean knowledge score was calculated. For all groups, mean knowledge scores for trained and untrained participants were calculated with difference in mean and 95% confidence limits. For comparison between two groups by training status, independent sample t-test was applied and significance level was calculated. A p-value of ≤ 0.05 was taken as significant. Further comparisons were made based on training status, district of appointment, health facility level, gender and facilitator of IMNCI. Here again independent sample t-test was applied to find the statistical significance. A p-value of ≤ 0.05 was taken as significant.

In the third step, for analysis between more than two groups one-way ANOVA test was applied followed by Tukey's post hoc test. A p-value of ≤0.05 was considered as significant. Mean score with standard deviations and significance level was calculated based on designation, service duration, year of IMNCI training and working experience in children ward. Tukey's post hoc contrast gave pair-wise comparison within the group.

Finally, mean knowledge score was calculated in each individual question by training status to find key areas of knowledge deficiency. Mean difference with 95% confidence interval were also calculated. Independent sample t-test was applied to compare groups by training status. A p-value of ≤0.05 was taken as statistically significant.

4.7 Ethical considerations

Institutional Review Board, Health Services Academy, Ministry of Health, Pakistan approved this questionnaire-based study.

All those eligible and willing to participate in the study were given the study questionnaire after brief verbal explanation. Filled returned questionnaire served as consent. Furthermore, all participants were assured that the study participants will remain anonymous and the data will be used only for the study purpose.

4.8 Funding and budget

Funding for the project was the responsibility of principal researcher. Photocopy and travel expenses were paid by the principal researcher himself. The researcher and an assistant researcher did practical realization of the study and data management. Participation of assistant researcher in data collection was voluntary.

5. RESULTS

5.1 Study participants from two districts

In total, 387 eligible first level rural health care personnel were approached in the study districts and 355 (91.7%) showed willingness to participate and accepted the study questionnaire. Response rate was 75.2% (267 of 355 participants filled in and returned the study questionnaire). Detail of personnel approached and respondents from two districts is given in Table-1.

Table–1: Study population approched and response rate in two study districts

District and health facility	Medical officers			Dispensers			Lady health visitors		
	Appr.	Part.	Resp.	Appr.	Part.	Resp.	Appr.	Part.	Resp.
Lahore									
BHU's (n=37)	34	33	30	37	37	36	36	30	28
RHC's (n=6)	18	18	17	19	16	10	16	13	10
Sheihkupura									
BHU's (n=65)	57	54	42	56	54	23	60	47	34
RHC's (n=7)	15	15	9	20	20	16	19	18	12
Total	124	120	98	132	127	85	131	108	84
			81.7%			66.9%			77.8%

Appr. = Approached, Part. = Participated, Resp. = Responded

5.2 Characteristics of study respondents in two districts

Just over half of the respondents were from Sheikhupura. About three fourth of respondents were from basic health units. In both the districts respondents from basic health units were more, as was expected, due to greater number of these health care facilities in both the districts. Percentage differences in respondents form rural health centers and basic health units in the two districts were negligible. Only one-fourth of the respondents were trained for clinical case management of IMNCI and all of them were

Table–2: Characteristics of the study respondents

Characteristics	Lahore (n=131)		Sheikhupura (n=136)	
	N	%	N	%
Health facility				
Rural health centre	37	28.2	37	27.2
Basic health unit	94	71.8	99	72.8
Designation				
Medical officers	47	35.9	51	37.5
Dispensers	46	35.1	39	28.7
Lady health visitors	38	29.0	46	33.8
Gender				
Male	72	55	84	61.8
Female	59	45	52	38.2
IMNCI training status				
Untrained	131	100	66	48.5
Trained	-	-	70	51.5
Year of training				
2008	-	-	14	10.3
2007	-	-	41	30.1
2006	-	-	8	5.9
2005	-	-	5	3.7
Not mentioned	-	-	2	1.5
Served as facilitator IMNCI				
No	131	100	129	94.9
Yes	-	-	7	5.1
Service duration				
<3 Years	50	38.2	54	39.7
3-10 Years	38	29.0	36	26.5
>10 Years	43	32.8	44	32.3
Not mentioned	-	-	2	1.5
Worked in Children ward				
No	98	74.8	99	72.8
Yes	33	25.2	37	27.2
IMNCI Training duration				
10 days	-	-	2	1.5
11 days	-	-	56	41.2
12 days	-	-	4	2.9
14 days	-	-	6	4.4
15 days	-	-	2	1.5

from Sheikhupura. There was a preponderance of medical officers and males in the study sample. Comparative characteristics of respondents from both districts are shown in Table-2.

5.3 Knowledge score of respondents

Overall, mean knowledge score about clinical case management of IMNCI among the study respondents was 6.3. Mean knowledge score obtained by trained first level rural health care personnel was 9.7 which was almost double the score obtained by their counter parts (5.1). In district Sheikhupura, difference in knowledge score was obvious between trained (9.7) and untrained (5.7) participants. Trained personnel from basic health units scored almost double (9.4) compared to untrained (4.8). Likewise, trained personnel from rural health centers scored much higher (9.7) than untrained (5.2). Interestingly enough, trained medical officers, dispensers and lady health visitors scored higher than untrained. Percentage difference in mean knowledge score was higher between trained and untrained medical officers compared to dispensers and lady health visitors. Trained medical officers scored more than double (10.7) compared to untrained (5.2). Mean knowledge score of trained dispensers was 6.9 where as of untrained was 4.2. Lady health visitors who were trained scored 9.3 compared to 6.0 in untrained. It is quite interesting that medical officers scored highest in district Sheikhupura (10.1) and lady health visitors scored maximum in district Lahore (5.6). On the other hand, dispensers scored least in both districts. Comparison based on designation and training status showed that among untrained personnel lady health visitors scored the maximum and among trained personnel, medical officers had the maximum score. While comparing mean score among untrained in both districts it was found that untrained in Lahore scored slightly lower than untrained in Sheikhupura. There was minor difference in mean knowledge score of untrained respondents from both districts. Comparative mean knowledge scores of trained and untrained personnel with 95% confidence limits are shown in Table – 3.

It is also interesting to appreciate that mean knowledge score was much higher among respondents from Sheikhupura (7.7) compared to those from Lahore (4.8). On knowledge scale, health care personnel serving at rural health centers scored slightly lower (5.6) compared to those working at basic health units (6.6) in the study districts (Table – 4).

Table–3: Mean (sd) knowledge scores based on training status

Characteristics	Untrained N = 197	Trained N = 70	Mean difference (95%CI)	p–value
District				
Lahore	4.8 (1.7)	--	--	
Sheikhupura	5.7 (2.5)	9.7 (3.4)	4.0 (5.0, 3.0)	< 0.001
Health facility				
Rural health centre	4.8 (2.3)	9.4 (3.4)	4.6 (6.8, 2.4)	< 0.001
Basic health unit	5.2 (1.9)	9.7 (3.4)	4.5 (5.5, 3.6)	< 0.001
Designation				
Medical officers	5.2 (1.9)	10.7 (2.8)	5.5 (6.6, 4.6)	< 0.001
Dispensers	4.2 (1.9)	6.9 (3.8)	2.7 (5.0, 0.5)	0.02
Lady health visitors	6.0 (1.8)	9.3 (3.0)	3.3 (5.1, 1.5)	0.001
Gender				
Male	4.5 (2.0)	9.6 (3.4)	5.1 (6.1, 4.0)	< 0.001
Female	5.8 (1.8)	10.2 (3.3)	4.4 (6.2, 2.6)	< 0.001
Service duration				
<3 Years	5.1 (2.4)	10.3 (3.3)	5.2 (6.6, 3.9)	< 0.001
3-10 Years	5.2 (1.4)	10.2 (3.1)	5.0 (6.4, 3.6)	< 0.001
>10 Years	5.2 (1.9)	8.2 (3.5)	3.0 (4.7, 1.2)	0.002
Worked in Children ward				
Not worked	5.0 (2.2)	8.9 (3.6)	3.9 (5.0, 2.8)	< 0.001
< 6 months	5.2 (1.5)	11.2 (1.7)	6.0 (7.3, 4.6)	< 0.001
6-12 months	5.6 (1.4)	11.3 (2.4)	5.7 (7.6, 3.8)	< 0.001
> 12 months	7.0 (2.9)	10.8 (3.8)	3.8 (16.3, 8.7)	0.3
IMNCI Training duration				
10 days	--	6.1 (2.8)	--	
11 days	--	10.2 (3.3)	--	
12 days	--	5.8 (3.2)	--	
14 days	--	9.1 (2.0)	--	
15 days	--	8.4 (4.2)	--	

CI=Confidence interval, sd=Standard deviation
P-value was calculated using two-sample t-test

Interestingly enough, negligible mean knowledge score difference was observed between male (6.2) and female (6.4) respondents of the study. Female respondents scored slightly higher in both trained and untrained groups compared to males. As was expected, knowledge score of facilitators of clinical case management of IMNCI was just over double (13.2) than the non-facilitators (6.1) and their score was highest among all the respondents of study. Comparative mean knowledge scores with 95% confidence limits are given in Table – 3 & 4.

Table–4: Knowledge score and results of independent sample t-test

Characteristics	Knowledge score Mean (sd)	Mean difference (95% CI)	Significance p-value
IMNCI training status			
Untrained	5.1 (2.0)		
Trained	9.7 (3.3)	4.6 (5.4, 3.7)	< 0.001
District			
Lahore	4.8 (1.7)		
Sheikhupura	7.7 (3.6)	2.9 (3.6, 2.3)	< 0.001
Health facility			
Rural health centre	5.6 (3.0)		
Basic health unit	6.6 (3.2)	1.0 (1.8, 0.1)	0.02
Gender			
Male	6.2 (3.5)		
Female	6.4 (2.5)	0.2 (0.9, 0.5)	0.60
Facilitator IMNCI			
No	6.1 (2.9)		
Yes	13.2 (2.3)	7.1 (9.3, 4.8)	< 0.001

CI=Confidence interval, sd=Standard deviation
P-value was calculated using two-sample t-test

Another expected finding was highest knowledge score obtained by trained medical officers; it was also interesting that trained lady health visitors scored much better than trained dispensers did. Another interesting finding of the study was no difference in mean knowledge score among trained health care personnel who served in rural health care sector for less than 3 years and 3-10 years, which was, little higher than those who reported service period more than 10 years. No such difference in mean knowledge score was seen between untrained with respect to service duration. There seemed an

effect of time since training on knowledge score as those trained during 2008 scored highest followed by trainees of year 2007 and 2006. It was strange enough to notice that trainees of year 2005 scored higher compared to those of year 2006 and 2007. Knowledge score was higher among those who had the working experience in children ward (8.1) compared to other group (5.9) (Table-5).

It is obvious that overall means score was much high among trained respondents from district Sheikhupura. Obviously trained personnel scored much higher than untrained in all categories.

5.4 Comparison between the groups: Independent sample t-test

Application of independent sample t-test for comparison between trained and untrained first level rural health personnel gave interesting results. All groups of trained personnel scored higher than untrained and the differences between almost all the groups were statistically significant (p-value <0.05). Statistically significant difference was observed between trained and untrained health care personnel in district Sheikhupura. Likewise, statistically significant difference was also noted between trained and untrained personnel of rural health centers and basic health units. Trained medical officers, lady health visitors and dispensers scored statistically higher than untrained. Difference in mean knowledge score was also statistically significant between trained and untrained men and women (Table – 3).

Differences in mean knowledge score were statistically significant when compared by training status, districts, heath facilities and facilitator status. Knowledge score obtained by male and female respondents was slightly different but without any statistical significance (Table - 4).

Table–5: Knowledge score: Results of one way ANOVA and Tukey's contrast

Characteristics	Score Mean (sd)	Significance p-value	Tukey's post hoc contrast Pair-wise comparison	Significance p-value
Designation				
Medical officer	7.6 (3.6)	< 0.001	Medical officer-lady health visitor	0.03
Dispensers	4.6 (2.5)		Medical officer-dispenser	< 0.001
Lady health visitors	6.5 (2.3)		Lady health visitor-dispenser	< 0.001
Service duration				
< 3 Years	6.6 (3.6)	0.02	<3 Years - >10 Years	0.39
3-10 Years	6.6 (3.0)		<3 Years - 3-10 Years	1.0
> 10 Years	5.8 (2.6)		3-10 Years - >10 Years	0.46
Year of training				
2008	11.0 (3.6)	0.3	2008-2007	0.24
2007	9.4 (3.4)		2008-2006	0.11
2006	8.3 (3.1)		2008-2005	0.98
2005	10.2 (2.1)		2007-2006	0.86
			2007-2005	0.97
			2006-2005	0.72
Worked Children ward				
Not worked (0)	5.9 (3.0)	< 0.001	0 - <6mo	0.90
< 6 months	6.3 (2.8)		0 – 6-12mo	< 0.001
6-12 months	9.4 (3.4)		0 - >12mo	0.25
> 12 months	8.5 (3.4)		<6mo – 6-12mo	0.02
			<6mo - >12mo	0.04
			6-12mo - >12mo	0.93

sd=Standard deviation
P-value was calculated using one-way ANOVA and Tukey's post hoc Test

5.5 Comparison between the groups: one-way ANOVA and Tukey's contrast

One-way ANOVA test gave statistically significant values for variables including designation, service duration and working experience in children ward. One-way ANOVA test value was statistically insignificant for year of training variable. When different designations were compared in pairs, it was found that all pairs were significantly different in terms of knowledge score.

Table 6: Knowledge score (mean) of health care personnel in individual question by training status

	Question	Overall mean	Mean in untrained	Mean in trained	Mean difference (95%CI)	Significance p-value
		N=267	N=197	N=70		
	Danger signs					
Q2	Danger signs in a sick child	0.31	0.20	0.64	0.44 (0.53, 0.34)	< 0.001
	Respiratory system					
Q3	Define stridor, wheeze and chest-in-drawing	0.19	0.07	0.52	0.45 (0.54, 0.35)	< 0.001
Q5	What is fast breathing and cut-off values	0.34	0.24,	0.61	0.37 (0.47, 0.29)	< 0.001
	Diarrhea and worm infestation					
Q4	Signs of severe dehydration	0.29	0.23	0.48	0.25 (0.33, 0.18)	< 0.001
Q6	Classify dehydration	0.34	0.26	0.57	0.31 (0.41, 0.21)	< 0.001
Q9	Define acute and chronic diarrhea	0.36	0.24	0.71	0.47 (0.59, 0.36)	< 0.001
Q11	What do you mean by ORS?	0.91	0.89	0.96	0.07 (0.13, 0.01)	0.02
Q8	How many times you will de-worm the child in a year.	0.59	0.48	0.88	0.40 (0.50, 0.30)	< 0.001
	Immunization					
Q10	Child immunization schedule in Pakistan	0.70	0.65	0.84	0.19 (0.28, 0.12)	< 0.001
	Nutrition and Breast feeding					
Q13	Signs of good positioning for breast feeding	0.12	0.03	0.37	0.34 (0.41, 0.25)	< 0.001
Q14	Signs of good attachment for breast feeding	0.15	0.05	0.42	0.37 (0.47, 0.27)	< 0.001
Q15	Dose of vitamin-A in 3, 8 and 15 month old baby	0.49	0.43	0.67	0.24 (0.34, 0.12)	< 0.001
Q7	What is low birth weight baby (LBW)?	0.67	0.61	0.86	0.25 (0.35, 0.14)	< 0.001
	Miscellaneous questions					
Q1	What do you understand by IMNCI?	0.66	0.60	0.82	0.22 (0.32, 0.12)	< 0.001
Q12	What is safe remedy?	0.18	0.11	0.36	0.25 (0.32, 0.18)	< 0.001

CI=Confidence interval

P-value was calculated using independent sample t-test

On the other hand, multiple comparisons applied to different service durations and years of training revealed insignificant differences among all pairs. Based on Tukey's contrast, different significance levels were observed between different pairs based on duration of work in children ward of a hospital (Table – 5).

5.6 Knowledge score in individual question

Study questionnaire focused on five main areas of neonatal and child care including danger signs, respiratory problems, diarrhea and worm infestation, immunization and nutrition. Mean knowledge score obtained in each question by training status is given in table–6. It is obvious that trained rural health care staff scored higher in all individual questions and the difference in mean knowledge score was statistically significant between trained and untrained. Over all poorer knowledge was noticed for respiratory problem (Table – 6).

6. DISCUSSION

This study aimed to assess and compare the knowledge of clinical case management of IMNCI among trained and untrained primary health care personnel. Respondents were from first level rural health care facilities in district Lahore and Sheikhupura of province Punjab in Pakistan. Indirectly, this study determined the impact of clinical case management of IMNCI training on the knowledge of health care personnel about childcare.

Findings of this study showed that a correlation existed in knowledge of clinical case management of IMNCI depending upon training status of health care personnel; knowledge score was little less than double among trained personnel compared to that of untrained. Therefore, it seemed that clinical case management of IMNCI training played a role in improving knowledge of health care personnel in this study.

Overall, the study participants were 58% deficient in theirs knowledge regarding clinical case management of IMNCI. Both groups, trained and untrained, were deficient in their knowledge about clinical case management of IMNCI. The deficiency was more marked among those who did not receive clinical case management of IMNCI training, as they were 66% deficient in their knowledge. Trained were also deficient in their knowledge by 36% but they were almost double knowledgeable than untrained. Reasons for deficiency among trained personnel could be poor recall of knowledge or poor training itself.

The study also found that the probability of having better knowledge score was higher among health care personnel of basic health units of district Sheikhupura and facilitators of the training. Over all better knowledge score in Sheikhupura was probably due to the reason that about fifty percent of participants from this district were trained for clinical case management of IMNCI compared to Lahore where none was trained. Better knowledge score among participants of basic health units compared to rural health centre could be explained by the fact that more trained personnel (83%) were working

at BHUs compared to RHCs (17%). Another explanation for better knowledge score among BHU staff might be helping each other while filling the questionnaire during their monthly meeting at one place in both districts. Best knowledge score obtained by facilitators is obviously due to the reason that they were involved and specially trained to provide trainings to the trainees. Knowledge score was almost same among male and female participants that explained same level of their understanding of the phenomenon. Better knowledge score of untrained in Sheikhupura compared to Lahore could be due to their working with trained and having access to training material in their health facilities.

Comparisons by designation, time since training, service duration and duration of working experience in children ward highlighted additional interesting findings. Designation, as proxy of years of education, seemed to have a correlation with knowledge score as medical officers scored highest on knowledge scale and dispensers least. Service duration seemed to have considerable effect on the knowledge score among the groups by training status. Likewise, year of training did not affect the obtained score significantly. There seemed some effect of duration of working in children ward on knowledge score.

Overall, all respondents had the poorest knowledge about respiratory problems. While examining key areas of deficiency between groups by training status it was clear that both untrained and trained primary health care personnel performed poorer in questions regarding respiratory problems.

6.1 Validity of the results

Surveying first level rural health care personnel in two districts including trainees and non-trainees of clinical case management of IMNCI and convenience sampling included strengths of the study. Furthermore, pre-tested questionnaire was used for the survey that was prepared by organization responsible for trainings in province Punjab of Pakistan.

To enhance the validity, a pre-tested structured questionnaire was used as survey tool. This questionnaire was developed by National program for Family Planning and Primary Health Care (FP & PHC) for assessment of trainees after the clinical case management of IMNCI training course in province Punjab of Pakistan. Questions were subdivided into parts in order to get answers that more precise and to accurately assign them a score (Appendix - II). Answers were marked in strict accordance with national clinical case management of IMNCI guidelines. Marking of all answers and total were verified twice. Validity was further ensured by carrying out double data entry and resolution of discrepancies with reference to original questionnaire data. Study questionnaire addressed major contributors of child mortality and morbidity including danger signs, respiratory problems, diarrhea and dehydration, nutrition and breast-feeding and immunization (Arrive et al., 2004, Benguigui et al., 2006).

The study population comprised of health care personnel (all medical officers, dispensers and lady health visitors) posted and serving at first level rural health care facilities in district Lahore and Sheihkupura of province Punjab in Pakistan at the time of survey. However, study participants included those who filled in and returned the study questionnaire. High response failure is difficult to analyze because of self-administered anonymous nature of study questionnaire that makes it impossible to identify and get back to non-responders in order to explore their reasons of non-participation and knowledge status.

It has been argued that response rates measure a survey's level of success in obtaining information from all eligible participants in a sample or population. Invariably, some members of the sample do not provide the desired information. Ineligibility of some members in the sample, non-existence of some sample members, refusal to take part, failure to locate and contact sample members, language barrier and physical limitations are reasons for failing in obtaining relevant information in a survey.

In this study, one reason of non-response by 88 participants might be the language barrier as was noticed during the first and subsequent survey visits. Participating

dispensers and lady health visitors faced problems in understanding questionnaire in English. This barrier was overcome by need-based translation of questionnaire in Urdu during survey. Additionally, reluctance, stigma and shame associated with self-perceived low performance might have resulted in refuse to participate and non-response. Language barrier could be another reason for refuse to participate and non-response. Unfortunately, 36 personnel could not be included due to reasons of vacant seats, involved in other official assignment, on leave or absent on the day of study visit or posting elsewhere on current charge basis.

It is evident that over all response was lower among health care personnel from district Sheikhupura (65%) compared to Lahore (89.1%). Least response was observed among dispensers (60.9%) of district Sheikhupura. Reasons for difference in response rate were difficult to analyze, as data is silent on this aspect. As it was known that trainings for clinical case management of IMNCI have been provided to the health care personnel in district Sheikhupura but training status of non-responders in this district was not evident due to limitation of data on this aspect. Therefore, there could be two assumptions; if it is assumed that non-responders have the same distribution of knowledge as participants of the study then no major difference could be expected otherwise results could have been different. Unknown training status of non-responders in Sheikhupura makes it difficult to conclude undoubtedly that the knowledge score obtained by health care personnel especially dispensers was true reflection of the target population.

Very few data points were missing, some participants, especially female participants, did not mention their age. Some participants did not mention their service duration where as some others did not mention their year of training. All these missing data points were excluded while analyzing the data. As very few data points were missing so, there was remote possibility that they had influenced the results of this study.

Official language in health care system in Pakistan is English. At national level, language of instruction in clinical case management of IMNCI trainings is English. Therefore, the study questionnaire was prepared in English. The same questionnaire,

with few modifications to make it easily understandable, was used as survey tool. Irrespective of these facts, during the survey it was observed that some of the participants (especially lady health visitors and dispensers) encountered difficulties in understanding, interpreting and answering some of the questions in English; might be due their educational background and language barrier. After recognizing this barrier during first survey visit need based verbal translation of questions into national language *Urdu* was done, for lady health visitors and dispensers, during first and subsequent study visits. The participants were also allowed to answer the questionnaire in *Urdu* in case of language barrier. This phenomenon might have affected the response rate or performance in some or all questions to some extent.

To the knowledge of researcher, so far, no refresher courses have been offered to the trainees of clinical case management of IMNCI. Some of the participants mentioned that they have attended refresher course, this might be due to the reason that some have attended trainer course to become facilitators that is generally offered to selected medical officers after first training. For this reason, this variable was also excluded from analysis.

It was strange to appreciate that trained participants mentioned different training durations (10 to 15 days). Since the commencement of trainings, all the participants have been trained during 11 days trainings (WHO-EMRO, 2008). Training durations more than 11 days mentioned by participants might me due the inclusion of days traveled to the training place or inclusion of weekend in the training period. Mentioning of 10 days training period might be due the reason of excluding the first or last day of training as on these days opening and closing ceremonies are also conducted. As training duration variable was not used in analysis so there is remote possibility that reporting different training durations have affected our results.

To the extent of available data, it is safe to say that this questionnaire survey data was of good quality and rather representative of the population of two districts under study, and therefore does not pose major threats to the validity of the results of the study.

6.2 Limitations of the study

In spite of the efforts to ensure validity, some limitations were recognized which are better to be acknowledged. Limitations of this study were mainly due to limitations of questionnaire.

Study questionnaire is silent regarding impact of other trainings or courses on the knowledge score of the participants. Questionnaire was specific to the clinical case management of IMNCI and did not ask for other relevant trainings on the subject. Therefore, it not possible to do further analysis to find any association of knowledge score with other trainings like control of diarrheal diseases (CDD) course, control of acute respiratory infection (ARI) course, expanded program on immunization (EPI) course, breast feeding course and some others (Nicoll, 2000, Patwari et al., 2002).

Study questionnaire assessed knowledge of participants, data does not allow analysis of attitude, and practices as questionnaire did not collect data on these aspects. It is very relevant to study attitude and practices as knowledge alone cannot ensure what needs to be delivered to children. Improved knowledge might have resulted in improved practices but this issue needs further assessment.

Although all the participants were informed about anonymous nature of questionnaire and that it was not an examination, still there is possibility that they might have helped each other to show better performance. This might be a reason for better score among BHU staff as they filled in questionnaire during their monthly meeting at one place.

6.3 Relation with previous studies

Many recent studies have shown that training of health care personnel in IMCI case management have resulted in considerable improvements in the quality of care for sick children visiting primary health care facilities (Amaral et al., 2005, Armstrong et al., 2004, Arifeen et al., 2004, Gouws et al., 2004, Kumar et al., 2009, Pariyo et al., 2005).

This study found improved knowledge among trained personnel compared to untrained. It may be assumed that better knowledge may result in improved quality of care.

Huicho et al in their multi-centre data evaluation found that in Tanzania longer pre-service trainings improved integrated assessment of sick child than shorter trainings. While in Bangladesh, they did not find any effect of pre-service training duration on such assessments. In two other centers, Brazil and Uganda, those with shorter trainings managed sick children more accurately than their comparison group. However, study concluded that irrespective of pre-service status, overall quality of childcare after IMCI training is not very much different across the groups. They further recommended that deprived communities could be served with personnel having shorter pre-service trainings (Huicho et al., 2008). This study found significant differences in terms of knowledge depending upon pre-service training. Overall Medical officers had the highest knowledge score followed by lady health visitors and dispensers. This study is unable to comment on performance and quality of care as data obtained is silent on this aspect. However, better knowledge can be taken as a proxy to better assessment and performance.

Some studies compared trained and untrained groups with respect to IMCI and revealed that there indeed exists a difference and these studies have been conducted in Africa and Asia where child mortality is high. The findings have shown that trained tend to have better knowledge and performance than untrained. Studies in Africa and Asia compared the knowledge and practices of health care personnel with regard to IMCI. Studies indicate that children in IMCI districts received better care compared to other districts (Armstrong et al., 2004b). The findings of this research are also in accordance with previous studies. This study differs in respect that it only compared knowledge but not the practices and performance. Like other studies (Armstrong et al., 2004b), the situation in two study districts of Pakistan was similar, as the knowledge score was higher among the trained personnel than the untrained. However, it is difficult to conclude that performance in questionnaire survey by the responders of this study was

solely related to IMNCI trainings or other trainings given to these personnel were a confounding factor.

It also seemed that qualification (years spent in education) and present position of health care personnel at health care facility was a predictor of knowledge score in the study groups. Some other studies have also found relevance of IMCI training of health care personnel with their educational background (years of university education) and therefore with their performance with respect to IMCI (Amaral et al., 2005, Arifeen et al., 2004, Gouws et al., 2004).

In Tanzania IMCI trainings conducted during last 3 years found to be associated with much better case management when compared with district without IMCI, the study further claimed that case-management was much improved by IMCI training (Armstrong et al., 2004b). This study covered health care personnel trained during last 4 years (2005-2008). Trainees of year 2005 and 2008 showed the best performance on knowledge scale. This study also concludes that knowledge score is much improved among trained irrespective of their year of training. In this study, differences in knowledge scores during year 2005-2008 might be due to differences in quality of trainings during these years. Another explanation for this higher score during these years compared to year 2006 and 2007 could be better participants. Pariyo et al have reported almost similar findings in their study done in Uganda (Pariyo et al., 2005). For this reason, some studies have emphasized the challenge of maintaining the effectiveness of clinical case management training while expanding the coverage to population level to achieve a meaningful population health impact (Pariyo et al., 2005, Victora et al., 2004).

From the retrieved literature, it is easily appreciable that IMCI/IMNCI training duration remained different in different countries for example 9 days in Ethiopia (Simoes et al., 1997), 8 and 5 days in India (Kumar et al., 2009). Some have claimed that longer trainings have operational constraints and shorter interrupted trainings may prove cost-effective (Kumar et al., 2009). Contrary to these, participants of this study reported

longer trainings (11-15 days) as was reported in Uganda (Pariyo et al., 2005). It is worth mentioning that since the commencement of IMCI/IMNCI strategy, trainings conducted in Pakistan were of 11 days (WHO-EMRO, 2008). Reasons for reporting different training durations (11-15 days) might be due to inclusion of weekend encountered during training, days spent in traveling to the training place or exclusion of first or last day of training as on these days opening and closing sessions take place.

Kumar et al reported significant ($P<0.05$) increase in average score among primary health care workers after IMNCI training. Additionally knowledge score improvement for most health conditions for example diarrhea, immunization, malnutrition, possible severe bacterial infection, and breastfeeding was observed (Kumar et al., 2009). Kumar et al further noticed improvements in counseling skill among trainees (Kumar et al., 2009). Results of this study also showed improved knowledge of danger signs, respiratory problems, diarrhea and worm infestation, nutrition and breast-feeding and immunization among trained. Questionnaire for this study did not contain questions to assess counseling skills. In this study, data regarding pre-training knowledge of trainees was lacking rather a comparison group of untrained health care personnel was studied which can be taken as proxy for pre-training knowledge.

Other studies assessed knowledge of health workers, out patient clinic nurses and other health care personnel with a very small sample size (Kumar et al., 2009, Simoes et al., 1997) but this study was done with a larger sample size (267) and included all key first level primary health care personnel including medical officers, lady health visitors and dispensers.

It has been argued that in order to achieve the measurable impact on child mortality reduction, IMCI clinical training may be accompanied by health system strengthening and community IMCI activities (Huicho et al., 2005). Tanzania and Bangladesh have succeeded in delivering clinical IMCI trainings along with improved health system and involving community and family (Arifeen at al., 2004, Armstrong et al., 2004). Simultaneous implementation of most of the components of IMCI strategy in

Bangladesh and Tanzania proved beneficial in reducing child mortality (Arifeen at al., 2004, Armstrong et al., 2004). On the other hand, little progress in child survival has been observed in Latin America and Caribbean (Peru, Brazil and Haiti) due to non-implementation of all components of IMCI strategy (Amaral et al., 2005, Huicho et al ., 2005) and unequally distributed limited resources especially for community and family practices (Arrive et al., 2004). This study did not address other key components of IMNCI strategy including performance of personnel, improved health care system and improved family-community practices.

In short, IMNCI strategy is good enough which can improve knowledge and therefore performance of health care personnel. To achieve desirable gains in child health all of its components must be implemented simultaneously with adequate coverage.

6.4 Public health implications

In Pakistan, neonatal and child health indicators remained persistently poor. Reduction in child mortality and improvement in child survival are among major public health challenges in Pakistan. This particular study has assessed knowledge of clinical case management of IMNCI among trained and untrained first level rural health care staff in two districts of province Punjab in Pakistan. Furthermore, this study has also assessed the effect of clinical case management of IMNCI training in improving knowledge of health care personnel. This study has also offered recommendations to plan better future trainings for health care personnel on the subject. Better knowledge and understanding of IMNCI strategy may help in providing better service to the sick children.

In Pakistan, neonatal and child health issues are not well recognized at public level due to illiteracy, general lack of information, poor understanding and non-recognition at state level. Many wrong concepts, false beliefs regarding neonatal and child health have roots in families and society thus hindering child survival initiatives. Therefore, there is need for improving public awareness and IMNCI strategy has addressed such issues.

Overall, it is clear that training have resulted in improved knowledge of clinical case management of IMNCI. Better knowledge may help in improving practices to improve child survival.

6.5 Future research implications

This study focused knowledge aspect of clinical case management of IMNCI training that is distant post-training knowledge of trained and first hand knowledge of untrained primary health care personnel. Study included medical officers, dispensers and lady health visitors serving at first level health care sector in two districts of province Punjab in Pakistan. Future studies could be planned by including other health care personnel for example nurses and medical technicians as they are also participating in IMNCI trainings. It is also advisable to expand the research to other districts and provinces. This may help in understanding differences in IMNCI trainings and their outcome.

It would also be interesting to investigate the pre-training and immediate post-training and late post-training knowledge of health care personnel regarding clinical case management of IMNCI. This may help in understanding the impact of IMNCI training and its long-term effects. Additionally, this study did not explore any practical skills achieved by the participants during training and further studies can address this aspect of training in pre-training and immediate post-training and late post-training periods. It would also be interesting to do health facility based survey to assess the ability of health care personnel to apply skills acquired during training at the time of patient-health care personnel interaction.

Present study focused partly on improved case management, a component of IMNCI strategy. Future studies may also focus other components of IMNCI strategy for example health system support and family and community practices.

For future studies, comparative mortality data should be collected in districts with and without IMNCI strategy. Comparing child health indicators in pre and post IMNCI

implementation periods will also provide useful information and help in measuring impact of IMNCI strategy in these districts. The effect of clinical case management of IMNCI trainings towards neonatal and child health survival in Pakistan must be studied and would be informative to plan future public health interventions to improve neonatal and child survival in Pakistan.

Phenomenon of language barrier demands that future trainings and questionnaire must offer both language versions, Urdu and English. Language of training literature and medium of instruction during trainings must be reviewed especially for dispensers and lady health visitors.

Interestingly enough, asking for favored medium of instruction and self-perceived benefit of training in improving health personnel's knowledge and skill would be helpful in better future trainings. Additionally, asking for practical arrangements of training can further help in making IMNCI trainings better.

It will also be interesting to assess the IMCI / IMNCI training process itself during future studies. This may help in identifying strengths and weaknesses of trainings. This in turn may help in planning better future trainings.

7. CONCLUSIONS AND RECOMMENDATIONS

The findings of this study throw light on the phenomenon of clinical case management of IMNCI training in two districts of Pakistan. Results show that clinical case management of IMNCI training status had an association with knowledge score. Other factors including level of health facility, designation, gender, service duration, time since training, training duration and working experience in children ward invariably affected the knowledge score. This study testified much higher knowledge score among trained personnel than their counterparts.

Unwillingness to participate and non-response were drawbacks of the study. Anonymous nature of survey did not allow exploration of non-participants and non-responders. Moreover, limited scope of data did not permit the exploration of impact of other trainings on knowledge score about clinical case management of IMNCI.

However, this data on knowledge of clinical case management of IMNCI from two districts of Pakistan has advantage of covering the entire study-base. For better elaboration of phenomenon, all primary health care personnel responsible for childcare, including non-responders and un-willing needs to be explored to better validate the results.

Keeping in view the scope and limitations of the study, further research may be extended to health care personnel in other districts. Other health care personnel such as nurses and medical technicians may also be included in future studies. Moreover, questionnaire must ask other relevant trainings that could add to knowledge without attending clinical management of IMNCI training. It would also be interesting to assess knowledge regarding clinical case management of IMNCI before training, immediately after training and in distant future to better judge the impact of training and long-term effect of training.

Considering language barrier, it is advisable to introduce dual language system in IMNCI trainings and literature. To overcome the language barrier, it is also recommended that future study questionnaire should be prepared using both English and Urdu languages to make it better understandable to all health care personnel.

It is further recommended that trainings during service, as a public health strategy, of all health care personnel serving at first level rural health care sector should be initiated. This may improve their knowledge and understanding about clinical case management of IMNCI and may result in improved practices. Better knowledge and understanding of clinical case management of IMNCI may also improve management practices for neonates and children resulting in their better survival.

ACKNOWLEDGEMENTS

I am grateful to the University of Tampere, Finland for providing me this opportunity to complete International Master's Degree Program in Health Sciences (International Health) at the Department of International Health, Faculty of Medicine. I am also thankful to Health Services Academy, Ministry of Health Pakistan for making the realization of this study possible.

I wish to express my gratitude to my supervisors' Professor Per Ashorn, Head of International Health University of Tampere and Professor Shakila Zaman, Dean Institute of Public Health Lahore, for supervising my research. Their valued guidance, motivation and support gave me confidence to complete this research. I am also grateful to the members of Institutional Review Board at Health Services Academy for accepting my research proposal.

I am thankful to Stephen Lawoko at Karolinska Institute Sweden and Patrik Dinnetz at Sodertorns University Sweden for their guidance in analyzing the data. I wish to thank Professor Dr. Amanullah Khan Head of Community Medicine Fatima Memorial College of Medicine and Dentistry Lahore for enlightening suggestions.

I highly appreciate contribution of Dr. Muhammad Safdar in data collection. I would like to thank Executive District Officers Health Lahore and Sheikhupura, District Officers Health Lahore and Sheikhupura and District Support Manager PRSP Lahore for their co-operation and facilitation in data collection. I am thankful to all medical doctors, lady health visitors and dispensers, working at BHU's and RHC's in Lahore and Sheikhupura, for their participation in the study.

Finally, my sincere thank to my family for their constant support during my studies and for all their love and concern.

Tampere, September 2009 **Rizwan Ahmad Khan**

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APPENDICES

Appendix – I

Map of province Punjab in Pakistan
City district Lahore and neighboring city district Sheikhupura are shown

Appendix – II-a

IMNCI Cross-Sectional Survey in Rural Punjab, Pakistan 2008

Information for the Participants

Dear Participant,

This survey is about the knowledge of rural health care staff of district Lahore and Sheikhupura of province Punjab in Pakistan regarding clinical case management of (IMNCI). You have been selected as representative of rural health care staff in Pakistan.

The information you will give may serve as tool to develop better training programs for rural health care staff in order to improve the neonate and child survival in Pakistan.
Participation in this questionnaire survey is **ABSOLUTELY VOLUNTARY**. The questionnaire is prepared in a way that no participant will be recognized after the survey so please **DO NOT** write your name on any paper.

Please read the question carefully and answer them sincerely. Answer the questions after reading the answering instructions carefully. Answer the questions based on your own knowledge. Write your answer in the space given on the questionnaire. If you have problems in understanding any of the questions call the attention of the person who distributed the questionnaire to you.

Your participation in this survey will be highly appreciated.
Thanks for your participation.

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Appendix – II-b

Questionnaire for IMNCI Cross-Sectional Survey Pakistan 2008

Questionnaire is based on national (Pakistan) guidelines for clinical case management of IMNCI made in collaboration with WHO and UNICEF

Participant #		Date of Survey	

INSTRUCTIONS:
1. Please circle the appropriate option / answer or fill in the blank where applicable.
2. Choose only one option from each question.

BASE LINE INFORMATION

1. Name of District
a. Lahore = 1 b. Sheikhupura = 2

2. Health Facility Level
a. RHC = 1 b. BHU = 2

3. Designation
a. Doctor = 1 b. Dispenser = 2 c. Lady Health Visitor = 3

4. Gender
a. Male=1 b. Female=2

5. Age
---------- Years ---------- Months

6. For how long you are serving in rural health sector (BHU/RHC).
a. Less than 3 years = 1 b. Three to ten years = 2c. More than ten years = 3

7. Have you attended IMNCI training?
a. No = 0 b. Attended Once = 1

8. When you last attended training (Year and month of training)?
Month ---------- Year ----------

9. What was the duration of IMNCI training?
---------- days

10. Have you attended any refresher course after IMNCI training?
a. No = 0 b. Attended Once = 1

11. When you last attended refresher course (Year and month of refresher course)?
Month ---------- Year ----------

12. What was the duration of refresher course/training?
---------- Days

13. Have you ever been facilitator of the IMNCI training course?
a. No = 0 b. Yes = 1

14. Have you ever worked in a Pediatric/Children ward in any hospital?
a. No = 0 b. Yes = 1
c. If yes then for how long? ---------- Months

Appendix – II-c

Questionnaire for IMNCI Cross-Sectional Survey Pakistan 2008

Questionnaire is based on national (Pakistan) guidelines for IMNCI made in collaboration with WHO and UNICEF

Questionnaire

#	Question	Score
Q1.	What do you understand by IMNCI?	(Max. score=1)
Q2.	Enumerate/write danger signs in a sick child?	(Max. score=1)
Q3.	Define following: stridor, wheeze, chest in-drawing	(Max. score=0.33x3=1)
Q4.	What are the signs of severe dehydration	(Max. score=0.20x5=1)
Q5.	a). What is fast breathing? b). What are cut-off values of fast breathing in i). Less than 2 months old? ii). 2 months to 12 months old? iii). 12 months to 5 years?	(Max. score=0.25x4=1)
Q6.	Classify dehydration?	(Max. score=0.33x3=1)
Q7.	What is low birth weight baby (LBW)?	(Max. score=1)
Q8.	How many times you will de-worm the child in a year?	(Max. score=1)
Q9.	What do you mean by acute and chronic diarrhea (define)?	(Max. score=0.50x2=1)
Q10.	Describe immunization schedule in a child?	(Max. score=0.20x5=1)
Q11.	What do you mean by ORS?	(Max. score=1)
Q12.	What is safe remedy? Give examples	(Max. score=0.25x4=1)
Q13.	What is good positioning for breast-feeding (signs of good positioning)?	(Max. score=0.25x4=1)
Q14.	What is good attachment for breast-feeding (signs of good attachment)?	(Max. score=0.25x4=1)
Q15.	What is the dose of Vitamin – A in baby of age i). 3 months old? ii). 8 months old? iii). 15 months old?	(Max. score=0.33x3=1)