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EDITORIAL

DEVELOPING HEALTH SYSTEM IN DEVOLUTION

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A system is defined as a bounded space where various phases exist in equilibrium and which contains a specified number of components (1). ISO-9000 defines a system as "the organization structure, responsibilities, procedures, processes and resources for implementing quality management".(2)

The evolution of health systems is linked to the history of mankind as these have developed as a consequence of the interest shown by the individuals and communities in protecting their health and in curing disease. Health systems development is shaped by political, social, cultural and economic values of societies.

Health systems have the following components: (3)

- ☐ production of resources (human, financial, technological etc.
- ☐ organization of programmes.
- ☐ economical support mechanisms.
- ☐ management methods.
- ☐ delivery of services.

The goals of health systems aim at improving health, reducing health inequalities, responding to the population needs and ensuring fairness in financial contribution. (4). Despite the dramatic health gains of recent decades, reflected in improved life expectancy, and reduced mortality at various ages, it is important to look carefully at how resources allocated to health are used, in order to maximize their added value and achieve better status for population.

The four main functions of health systems are; stewardship; financing; service delivery; and

resource development. The first two functions are usually overlooked, as they need developing norms, legislation and standards to improve their implementation.

One of the main problems facing health sector development is the lack of system approach. One of the Health for All policy document has identified the following problems in developing countries in implementing national policies and strategies: (5)

- a) weak policy formulation, analysis, coordination and regulation.
- b) poor referral system and tendency to bypass the locally available health facilities.
- c) weak health information system.
- d) weak decentralization of health system based on primary health care.
- e) poor working conditions of public employees with low salaries leading to demoralized staff.

In the current scenario of devolution of authority at the District level, the health system functions should be started with a good situation analysis. Case studies related to various functions should be undertaken in the specific political, social and cultural environment. The prescriptive phase of health system would involve identifying technical and institutional support needed in developing and strengthening the functions of health systems. A great deal of capacity building would be needed. The development of new

capabilities cannot be sustained without some institutional development and support at provincial and federal levels.

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Review Article

DETERMINING THE FACTORS THAT INFLUENCE THE REFORMS IN THE HEALTH SECTOR

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Summary

This review article is aimed at determining the factors that influence reform initiatives introduced in a health system. These reforms need to be analysed in the perspective of health policy process first. This, however, necessitates development of a framework for analysing the health system and health sector reform initiatives. This article starts the debate by defining the terms: 'health system reform'; 'health care reform'; 'health services reform'; and 'health sector reform'. This is followed by a brief on the typology of reforms. Decentralisation has been reviewed because this forms the main strategy for reforms. Since these changes have implications not only on the individual tenets of the health system where they are focussed, but also on its overall policies and institutions (WHO, 1993). Therefore, various issues that surround the health policy are also discussed. After establishing an analytical framework for the reform initiatives, the factors that influence the process for reforms are discussed. It is concluded that these factors may be associated with different components of health system i.e. within the health sector or around in the external environment. Nonetheless, there could be certain crosscutting factors, which affect the entire reform process and may therefore be explored in the context of policy analysis for health sector reform. Accordingly a three dimensional view of health system, health sector reform and policy analysis is theorised.

Definitions

In the usage of various terms related to reforms, health has the same meaning as the WHO propounded. This is 'a state of complete physical, mental and social wellbeing, and not merely the absence of disease or infirmity'. The health system 'comprises of five actors: governance; health care/services; communities; resource generators; and support services. These ingredients of health system are in active relationship with each other; a phenomenon that takes place in an environment where other such systems are also operative'. Building on this definition and using the framework developed to analyse the health system, the 'health care' or 'health services' denotes the same, and constitutes an element of the health system. Similarly, if environment is excluded from the health system framework, the remaining five elements would form the 'health sector'. From this point, I move to defining the 'reform' in the health perspective, with the help of

literature review.

The 'reform' characterizes "a social action, which does or should improve the conditions, remove unfairness, etc. in a society" (Longman English Dictionary, 1985) and has been used distinctly from the 'revolution' or 'evolution' in the literature. Reform implies building upon and improving what exists and is defined in Oxford English Dictionary (1971) as 'to convert into another or better form or the amendment or altering for the better of some faulty state of things. Seedhouse (1995) argued, however, that any reform, by default, 'must aim to reconstruct an existing structure or system in order to enable it to achieve its original end (s) in an improved way'.

Berman (1995) defined the 'health sector reform' as a positive change that implies "a process of sustainable, purposeful change to improve the efficiency, equity and effectiveness of the health sector". From this, it is deduced that the 'health

care reform' or 'health services reform' connotes a change in the health care or health services component of the wider health system. On the other hand, the 'health system reform' would envisage across the board change that involves also the 'environment' in which the healthcare system operates.

However, what is the change or initiative that merits as reform. According to Seedhouse (1995) this must fulfil five conditions: area of activity; original desired purpose of this delineated activity; why the existing setup is not achieving desired purpose; or achieving it at an unwanted cost; and how such a situation is addressed. And to determine that intervention (5th condition) qualifies as reform and that it is happening, an information system is essential (Berman, 1995 and Collins et al 2000).

Typology

Literature abounds with the different forms of reforms introduced into health sector. Chernchovsky (1995), while relating his work to the reforms in the OECD (Organisation for Economic Co-operation for Development) described three main systemic functions of reform: financing of care; organisation and management of the consumption of publicly funded care; and provision of care. Berman (1995), explored it further and presented four major areas of reform action: health care financing; organisation of health care provision; health care package; and consumer demand and behaviour. Cassels (1997), however, listed six main components of reform programmes set out as interventions: improving the civil services; decentralisation; improving the ministry of health functioning; broadening health financing options; introducing managed competition; and working with or outsourcing services to the private sector.

Each of the above-mentioned interventions has within its remit several options or sub-systems. For example, seven models for health financing and methods of paying the providers have been described (OECD, 1992). In similar vein, three major forms of decentralisation: administrative, financial and legal are identified in the context of the Punjab public sector, (Project Management Team, 1998). Administrative powers and for that

matter the principles and code of conduct for regulation, maintaining the efficiency and discipline and other human resource management issues are laid down by the S&GAD (Services and General Administration Department). Extent of control over the resources varies from one tier to the other in the health system hierarchy, which is determined by the Finance Department. In addition, there is a plethora of other functions, which do not fall in the ambit of administrative or financial functions. Called as 'legal', these functions are performed at different levels in the hierarchy of health care delivery network and are governed under certain enactment and have been promulgated through legislature (Collin et al in preparation).

Decentralisation as a Strategy for Reforms

Decentralisation figures as an important strategy for the reform initiatives. It is, therefore, imperative to also study this concept in a greater depth. Cheema and Rondinelli (1983) have defined this as:

"Transfer of resources, decision-making, planning, and management functions from the central government system to such bodies as field agencies, sub-ordinate units of government, semi-autonomous public corporations, local government, area-wide or regional development organisation and/or specialised functional authorities".

It has been argued that decentralisation is a political issue that hinges on power within the state system and access to the political decision-making process and allocation of public resources (Collins and Green 1994). Therefore its application should not be limited to resolving the technical issues of efficiency and effectiveness in management and organisation. Instead, decentralisation has become a popular part of the policy approaches adopted by the governments and the following inventory of reasons can be deduced [Collins and Green (1994) and Gross and Rosen (1996)]:

- Increases responsiveness to local needs because decisions are made by those who have greatest access to information and are

- familiar with local conditions,
- Facilitates mobilisation of the under-privileged and community participation,
- Improves access of the poor to public goods and services,
- Promotes national unity and political education by involving communities,
- Softens the resistance to change,
- Allows greater opportunity for inter-sectoral collaboration,
- Overcomes the disadvantages of centralised and distant bureaucracies reduces the red-taps, and
- Facilitates adaptability, flexibility and efficiency in management systems.

Decentralisation takes different forms, which are briefly explained below relying heavily on the framework provided by Collins (1994).

Functional deconcentration is a system of administration in which the peripheral offices possess specific vertical links with the centre. There is a division of labour and for each segment of activity there is a central ministry, which has its own deconcentrated hierarchies and line of control that extends to the communities. In this type of decentralisation different offices look upward and not horizontally, hence there is hardly any inter-sectoral collaboration.

Prefectoral deconcentration is an integrated system whereby a sub-ordinate level assumes all/or most of the state functions with one prefect appointed and accountable to the centre. S/he embodies all the authority of all central ministries, which communicate through him/her with their field formations.

Devolution involves the transfer of functions or decision-making authority to legally incorporated local governments, such as provinces, districts or municipalities. The devolved units frequently possess greater autonomy than the deconcentrated units. However, care must be exercised while identifying a devolved unit since the local governments are often closely controlled by the central governments this is not a true devolution.

Decentralisation to local bodies with mixed central and local or regional representation like District Council or such elected bodies that often

have their own legal status. Due to their varying degree of dependence on the centre for resources, there may be a wide range of options ranging from the extensive powers and development functions to merely a role for co-ordination and information exchange.

Delegation to semi-independent bodies involves vertical dissection of state functions at the centre and establishment of separate and parallel hierarchies within the public sector to carry out their respective functions. Since, there is often no direct supervision of such body; this is also referred to as indirect administration.

Federalism receives its powers not only from the national government but also from the constitution. Such federal units may, however, lose their powers and become subservient to the national governments if constitutional provisions for such delegation of powers are changed.

Establishing the public sector markets is a conscious attempt of the government to introduce market mechanisms in the public sector. A healthcare purchaser falls into contract or service agreement with a healthcare provider both from the same umbrella organisation. (Sheaff, 1999). Such market competition is introduced into the public sector on the assumption that it will lead to a greater efficiency. However, this could only be over-generalisation and may require several considerations (Collins et al, 1994b) like equity and access of poor and elderly to health care since this may pose un-acceptably high social cost (Battistella, 1993).

Reforms in the perspective of Health Policy

From the earlier discussion to define the 'health sector reform' it is clear that the reforms have a bearing on the overall purpose, context, strategies and institutional capacity to implement the proposed changes. Further, since these changes take place in the health system or even in any of its sub-system; these have implications not only on its individual tenets where they are focussed, but also on the overall policies and institutions of the health system (WHO, 1993). Therefore, and for a better understanding of reforms, health policy is discussed in the premise that it is troublesome and

a "fuzziness" surrounds this concept. This is due to ordinary mistakes; deliberate vagueness in policy making; and problems in relating the national level/data to the analysis of policy development (Kroneman and Van der Zee, 1997).

What is meant by Health Policy?

The term policy is vague and has been used in many ways (Barker, 1996). Hogwood and Gunn (1984) provide an inventory of ways the word 'policy' has been used. This ranges from an expression of a general purpose or decision of government to a theory or a process for over a much longer time. Given the large vocabulary and synonyms for policy, it is, however, emphasised that it should be distinguished from decision as opposed to that it involves a series of decisions. However, it is less readily distinguishable from the terms 'administration' or 'bureaucracy' since these denote the carrying out or implementation of policy (Parsons, 1995). Sometime there could even be no policy on certain issues; this is 'an attempt to define and structure a rational basis for an action or no action' (ibid.).

The health policy, has three objectives: explicit, philosophical, and short-term political, which determine the shape of the health system and any reform in there (Gilson, 1999). However, for the purpose of this article we opt for the definition given by Walt (1996). Accordingly, "health policy embraces courses of action that affect the set of institutions, organisations, services, and funding arrangements of the health care system. It goes beyond the health services, however, and includes actions or intended actions by the public, private and voluntary organisations that have an impact on health" (ibid).

How Policies are made?

Policymaking is a complex and dynamic process and different models have been provided for its analysis. Out of these, the commonly encountered are Walt (1996), Barker (1996), Parsons (1995) and Hogwood and Gunn (1984). According to Walt policymaking process has four stages: problem identification and issue recognition; policy formulation; policy implementation and policy evaluation. Barker (1996) related it to the planning process and distinguished a number of

steps that are involved in the policy making process as in figure-1.

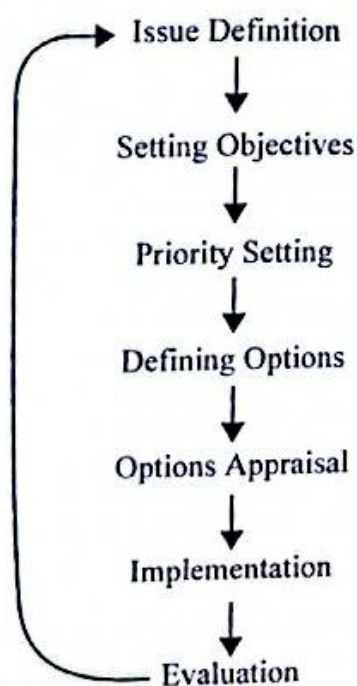


Figure-1: Stages in policymaking process (from Barker (1996) pp-28)

Hogwood and Gunn (1984) provided a 'stagist' model with the following steps:

1. Deciding to decide (issue search and agenda setting)
2. Deciding how to decide (issue filtration)
3. Issue definition
4. Forecasting
5. Setting objectives and priorities
6. Option analysis
7. Policy implementation, monitoring, and control
8. Evaluation and review
9. Policy maintenance, succession, or termination

Parsons (1995) presented the policy process in a cyclic fashion. Various steps involved in the process are problem definition, identifying

alternative solutions, option evaluation, selection of policy option, implementation, and evaluation. The 'policy life cycle' presented figuratively by him is given in figure-2.

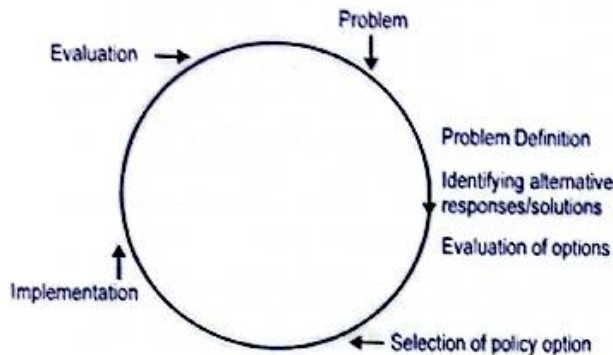


Figure-2: The Policy Life Cycle (from Parsons (1995) pp-77

The above models indicate that there is a certain level of rationality in the policymaking process. However, to what extent the policymakers have considered this, Walt (1996) argued for adjudging the process to know whether it was rational, incremental, or mixed scanning. By rational, it is meant that the policymaker follows various steps in a logical order and the result was a rational decision that most effectively achieved the purpose. The incremental model accepts at the outset that only few issues can be resolved at a time i.e. policymaking is a serial phenomenon and policymaker have to come back and forth to address different issues. Mixed scanning is a middle position where policymaker divides the process into micro and macro decisions the latter are taken first, while the former are looked into later during implementation. In what follows is an attempt to demonstrate that policy analysis is basic to rational planning of any cogent reform.

Policy Analysis

This aspect of policymaking, which has often been neglected especially in the health sector, is of great practical importance (Barker, 1996 and Walt & Gilson, 1994). The emphasis, here, is on finding the facts and intelligence gathering in order to determine as to how a reform should be carried out. Parsons (1995) divides this process into meta-analysis, meso-analysis, decision-analysis and delivery analysis.

❑ Meta-analysis involves 'what methods and approaches' are used in studying a policy. Barker (1996) describes three broad categories of such methods. First is 'asking the public', which may involve methods like interviews, focus group interviews and/or group interviews. Second is 'asking the experts' and methods that may be employed range from brainstorming to using Delphi technique and consensus building conferences. While the aforementioned categories are aimed at collecting information, third category of methods deals with processing and analysing data. These include, for example, operational research and techniques like cost-benefit-analysis, cost-effective-analysis.

❑ How the issues and problems are defined and agenda is set, is meso-analysis this corresponds to the Hogwood and Gunn's first three steps of policy process. This is pre-decisional stage of policy process, which involves identification and anticipation of problems or opportunities that suggest the need to consider some action. After that a conscious decision is required to make choice of issues on the basis of an explicit criteria. Once, a problem or policy issue has been identified, it is further analysed to define it in its depth and breadth.

❑ Decision analysis, on the other hand is considering how the process of decision making, per se, takes place? This involves forecasting, setting objectives and option analysis (ibid.). Forecasting is speculating as to how the situation will develop if it is allowed to continue. This concerns the expected future and may be established by extrapolation, using judgmental or modeling techniques. Setting objectives and priorities relates to the desired future and is central to the administrative and political rhetoric. Since there could be several alternatives to achieve objectives, these are analysed using techniques like cost-effectiveness analysis, cost-benefit-analysis or decision analysis. The best alternative is then selected for implementation.

- Lastly how the policies are administered and managed delivery analysis i.e. Hogwood and Gunn's steps for policy implementation, monitoring and control, evaluation and review, and maintenance, succession, or termination. For effective implementation, which is part of the policy process, it is essential that potential problems be anticipated and measures to combat these are built in to the programme. Monitoring implies seeing whether the programme is performing as planned and if not remedial measures may become necessary. Unlike the output, which is the focus of implementation, monitoring and control; evaluation and review are concerned with outcome and focus shifts to whether the policy is working as intended or requires review. This may then entail in decisions like maintaining the policy, replication to other areas or its terminating.

Analytical framework for Health Sector Reforms (HSR)

Health is a multifaceted issue and so are the health reforms. These have different characteristics and attributes that determine the overall dimensions of reform (Gonzalez-Block, 1997). However, to establish a common understanding and as a means to analyse the reform initiative, it is essential to devise a framework. A number of authors (Frenk, 1995; Gilson and Mills, 1995; Walt and Gilson, 1994, and Gonzalez-Block, 1997) have presented frameworks for analysing reform initiatives.

Walt and Gilson (1994) consider in their model, three basic elements: context; content; and process, interlocking with actors that assume the central role. On the other hand, Frenk (1995) argues that for appraising any reform proposal four fundamental factors must be kept in view. These include: problem, proposal, protagonists and the broad principles and purpose that should be defined as a measure to formulate the vision and mission of the health system under reform. He omits the 'process' from his analytical model since the reform is yet to be implemented. However, given that one aims to analyse various reform initiatives already undertaken, a framework is adopted (figure-3), which essentially combines the models presented by Walt and Gilson (1994) and Frenk (1995).

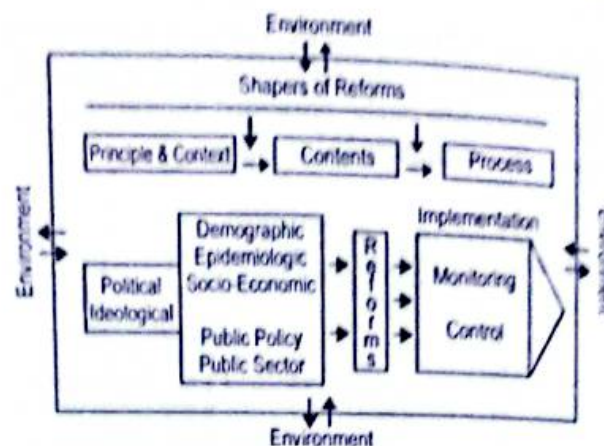


Figure-3: Analytical framework for the process of Health Sector Reforms

Shapers

This facet of analytical framework will address the question as to 'who sets the agenda' (Walt, 1996) and who is at the helm of affairs while identifying the problem, determining the need for intervention including setting its vision and strategies and finally implementing and evaluating the reforms. Maybe this is the government, organised interest groups; whether international, such as World Bank, IMF, and Aid Agencies or national, such as NGOs, Chambers of Commerce and Industry etc (ibid.). However, this must not lose sight of the beneficiaries - for whom this entire set up is created. Mills and Gilson (1994) classify these actors as social, political and public.

Frenk (1995), while emphasising to identify the actors argues that this would facilitate anticipation of prospective support and possible barriers in implementing reforms. He categorises them, on the basis of his model for health system, into: providers, resource generators, government, and population. Glassman et al (1999) from their analysis of reforms in the Dominican Republic identify five key groups of players namely: public sector, private sector, unions (or civil politicians), political parties (or public politicians) and other non-governmental organisations. Chinitz (1995) refers them as sub-governments because they determine the contents of public policy and shape its process. According to him 'there is no real indication that the general public supports the health reforms per se' and he attributes it to the politician's lack of interest in shaping their opinion regarding substance of reforms.

The principles and purpose

Seedhouse (1995) emphasises that unless a reformer has first thought out that what is meant by reform and defined the principles that should guide the practical reform process, this cannot even begin to make any cogent change. In his view, reform must be forward looking and should lead to a higher stage of development. Hammer and Berman (1995) identify three poles around which the international debate on the strategies for health sector reform revolves. These are improving aggregate health status, improving equity and reducing poverty, and improving individual welfare. Frenk (1995) expands this concept and proposes four principles: citizenship, pluralism, solidarity, and universality. Similarly, he suggests three purposes: equity, quality, and efficiency. He argues that a system that bases its mission on such principles and purpose should satisfy both the users and providers. Also this addresses the broader question as to 'why' reforms.

Context

"Transformations are undoubtedly taking place, but they are almost always based on incomplete thinking, and are often on account of reasons which do not make sense" (Seedhouse, 1995). Therefore, as Collins et al (1999) emphasise that understanding of policy context constitutes a critical element of policy analysis, which contributes to the development of policymaking in four ways: developing objectives of HSR, policy appropriateness, policy process, and political feasibility.

The context is to explore the health system that is under reform and the problems or issues which it faces justifying the introduction of intervention including as to why the existing set up is failing to achieve the desired results? Collins et al (1999) identifies six categories of factors or rationale for reform: demographic and epidemiological, socio-economic, economic and financial policy, politics and the political regime, ideology, public policy and public sector, and external factors. I would use this framework in the perspective of the health system model to determine the rationale for reform initiatives.

Content

The contents are the fine tenets and a set of decisions for transforming the contextual grounds to a statement of desired future and identification of means to achieve these. The reform interventions may range from a piecemeal change to a comprehensive restructuring. However, there could be another category where the change (reform) is gradually built up - incremental. In other words, this aspect of framework deals with 'what' of reforms and any concomitant change that may be happening in the health system? Whether any support mechanisms were installed to manage the resulting change and to build the capacity of implementing agency? Also whether any communication strategy has been developed and to what extent this has been used to consult and involve the stakeholders? Whether or not the intervention and installation of mechanisms was piloted for learning lessons?

Process and methodological considerations

Gilson (1999) argues that reform processes are not simply technical strategies but involve social changes that are value-laden and often conflict-ridden. She concludes that the reform processes [extracts from: Gilson (1999):

- "are the values, actors, and actor's perspectives hold significant importance over the content and process of reform;
- require understanding whether or not reforms are effective is dependent on understanding social goals and values, as well as the explicit objectives of reforms;
- for their successful implementation requires both good political and managerial skills and strategies, and processes for data gathering and dissemination; and
- for their success need not only the institutional capacity and skills but also a set of principles that govern relationships among the different parties."

I view this section hinging on the questions of 'how' and 'when' were the reforms implemented giving details about various events in a

chronological order. Finally, what actually happened to the initiative continuing, replicated, modified and continuing, or terminated? This will also look in to the government procedures for reform management in terms of their implementation, monitoring and control.

Factors influencing the HSRI

Glassman et al (1999), generalising the results of the analysis of the political dimensions of reform, suggests six factors that affect the pace and feasibility of reforms. These are the leadership, location, ownership, strategy, language, and timings of the reform. In another study in seven states of USA, it concludes that in all nine lessons three major and six minor are learned [Paul-Shaheen, 1998].

Major categories

1. "Crisis serves as a powerful catalyst for political action creating a window of opportunity for policy change;
2. New interest groups break the monopoly of existing groups on policy thus enhancing the opportunity for reform; and
3. Health reforms are highly technical; the bureaucratic influences are increased".

Minor categories

1. "Timings of reforms;
2. Reform process is a continuum. The comprehensive reforms are the product of earlier, smaller steps that serve as building block;
3. Entrepreneurship is an essential component of reform. Comprehensive reform requires individuals with vision, pragmatism and dedication to guide the way;
4. Media and public opinion helps keep the issue alive on the policy agenda;
5. Democratic leadership facilitates the comprehensive health reform process; and

6. Single-players are like paper tigers in the reform process".

Analysis of health sector reform initiatives using the aforementioned framework may lead to identification of factors that have influenced, facilitated or hindered the output of reforms. These may be associated with different components of the health system i.e. within the health sector or around in its external environment. Nonetheless, there could be certain crosscutting factors affecting the entire reform process and may therefore be explored in the context of policy analysis for health sector reform. In this background, **Figure-4** provides a three dimensional view of relationship between health sector, health sector reform and health policy analysis.

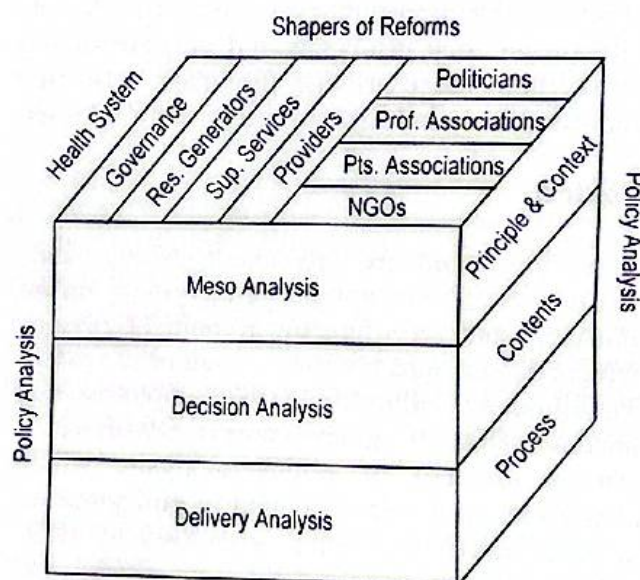


Figure-4: Analytical framework for identification of factors influencing the reform process

Conclusion

Reforms are taking place everywhere and the social sector particularly health has been in the focus. The governments used this as a strategy to address issues in the health sector. However, not much effort has been made to analyse the policy process in terms of the origin, process and implementation of reforms. Similarly the factors that influence whether positively or negatively the outcome of these changes need to be determined. This is essential in order to learn lessons and to blend any future undertaking of this sort. In this

context, this article provides a framework to analyse the reform initiatives in the health policy perspective using the health system as its premise.

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A STUDY OF RELATIONSHIP BETWEEN FEMALE LITERACY LEVEL AND FERTILITY BEHAVIOUR

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SUMMARY

Literacy especially the female literacy rate is very low in Pakistan. This study was conducted to find out the effect of education of women on their fertility behavior. The study was carried out in Bahawalpur city from July to mid September 1997. A total number of 436 respondents were interviewed and data was collected through a closed questionnaire. Percentages of current or ever users of contraceptives were 51.2, 71.7 & 75.6 in low, medium and high educational level respondents respectively. 48.3 percent low, 36.9 percent medium and 5.7 percent high educational level women were having five or more children. An insignificant relationship was observed between educational level and spacing of the children.

KEY WORDS: Fertility: To have total number of living children.
Education: Women must have attended the school.

Introduction

Education plays a crucial role in individual's well being and society's economic and social progress. More and more emphasis has been placed on women's education both at national and international political forums (1). Women play a pivotal role in raising children, care of older, and maintaining family's health. Schooling helps the women to acquire the knowledge to do so (2). Schooling shapes the attitudes, opinions and values of women (3). Education exposes the women to family planning knowledge and their participation in extra domestic activities before marriage (7). According to Pakistan demographic health survey 1999 about contraceptive use of women living in the urban areas of major cities were five times as likely as rural women to be current users. So these women appear to be leading the way in early stages of fertility decline (4). Investment in female schooling in urban Pakistan will encourage the limitation in child bearing within marriage (5). The level of education of wife is more strongly correlated with a couple's fertility than the educational level of the husband (6). Most studies indicate that fertility declines with level of women's education (9). Sri Lanka is a developing country like Pakistan, but

its social indicators are much better than Pakistan and that is mainly due to its female literacy, which is 87% in Sri Lanka as compared to 24% in Pakistan (10). This remarkable difference reflects its impact on fertility and mortality levels (8). Education engages large number of the women in paid employment out side the home which leads to change in economic and social circumstances in women's life (11).

Methodology

The study was conducted in Bahawalpur City. The study population comprised of married women aged 15-49 years with at least one child. The city of Bahawalpur was stratified on the judgmental basis into relatively upper, middle and lower class localities. While making the judgment about the class of locality the variables of income, occupation and general style of living were taken into consideration. There were 2905 households (525 upper, 687 middle, and 1693 lower class) in all localities. Expecting contraceptive prevalence as 32% (13) with 4% precision at 95% confidence interval a sample size of 436 was calculated. Every 7th household was included in the study by taking proportionate sample of all classes (79 out of 525, 103 out of 687 and 254 out of 1693). Data

was collected with the help of lady health workers along with their supervisors by using pre-tested questionnaire. Collected data was coded and analysed on computer. The level of education was scored (Nil=0, Primary=1, Middle=2, Matric=3, Intermediate=4, Graduate=5, Post graduate=6.).

Fertility behaviour was looked at for three dimensions (Fertility of women, spacing of children, and use of contraceptives).

TABLE 1
Age of the respondents

Age (Years)	Frequency	Percentage
<= 20	14	3.2
21-25	45	10.4
26-30	129	29.6
31-35	105	24.1
36-40	88	20.1
41+	55	12.6
TOTAL	436	100.0

TABLE 2
Educational level of respondents

Education	Frequency	Percentage
Nil	203	46.6
Primary/Middle	45	10.3
Matric	47	10.8
Intermediate	54	12.4
Graduate	57	13.0
Post Graduate	30	6.9
Total	436	100.0

TABLE 3
Educational level of Respondents
(According to category)

Educational level	Frequency	Percentage
Low (Zero)	203	46.6
Medium (1-3)	92	21.1
High (4-6)	141	32.3
Total	436	100.0

TABLE 4
Educational level and Fertility of respondents

No. of children	Low (Zero)		Medium (1-3)		High(4-6)		Total	
	Frq.	%	Frq.	%	Frq.	%	Frq.	%
<=2	38	18.7	18	19.6	68	48.2	124	28.4
3-4	60	33.0	38	43.5	65	46.1	163	39.4
5& More	105	48.3	36	36.9	8	5.7	149	32.2
Total	203	100.0	92	100.0	141	100.0	436	100.0

$\chi^2 = 87.7454$, $df = 4$, $P < 0.001$

TABLE 5
Educational level and Fertility of respondents by controlling their duration of marriage

<=5 years of marriage duration

No. of children	Low (Zero)		Medium (1-3)		High(4-6)		Total	
	Frq.	%	Frq.	%	Frq.	%	Frq.	%
<=2	18	90.0	9	90.0	28	90.3	55	90.2
3& more	2	10.0	1	10.0	3	9.7	6	09.8
Total	20	100.0	10	100.0	31	100.0	61	100.0

$X^2 = 0.842$, $df = 2$, Not Significant

6-10 years of marriage duration

No. of children	Low (Zero)		Medium (1-3)		High(4-6)		Total	
	Frq.	%	Frq.	%	Frq.	%	Frq.	%
<=2	11	22.4	3	17.6	21	50.0	35	32.4
3& more	38	75.6	14	82.4	21	50.0	73	67.4
Total	49	100.0	17	100.0	42	100.0	108	100.0

$X^2 = 9.164$, $df = 2$, $P < 0.05$

11-15 years of marriage duration

No. of children	Low (Zero)		Medium (1-3)		High(4-6)		Total	
	Frq.	%	Frq.	%	Frq.	%	Frq.	%
<=2	4	8.5	1	4.1	12	37.5	17	16.5
3-4	15	31.9	16	66.7	18	56.3	49	47.6
5&More	28	59.6	7	29.2	2	6.2	37	35.9
Total	47	100.0	24	100.0	32	100.0	103	100.0

$X^2 = 32.76$, $df = 4$, $P < 0.05$

16 & above years of marriage duration

No. of children	Low (Zero)		Medium (1-3)		High(4-6)		Total	
	Frq.	%	Frq.	%	Frq.	%	Frq.	%
<=2	5	5.7	5	12.1	7	19.4	17	10.4
3-4	12	13.8	9	22.0	23	63.9	44	26.8
5&More	70	80.5	27	65.9	6	16.7	103	62.8
Total	87	100.0	41	100.0	36	100.0	164	100.0

$X^2 = 45.448$, $df = 4$, $P < 0.05$

TABLE 6
Educational level and use of contraceptives in current/ever users

Contraceptive users	Low (Zero)		Medium (1-3)		High (4-6)		Total	
	Frq.	%	Frq.	%	Frq.	%	Frq.	%
Users	104	51.2	66	71.7	108	75.6	278	63.8
Non Users	99	48.8	26	28.3	33	23.4	158	36.2
Total	203	100.0	92	100.0	141	100.0	436	100.0

$\chi^2 = 26.3147$, $df = 2$, $P < 0.001$

TABLE 7
Educational level and use of contraceptives in current/ever users by controlling their marriage duration

<=5 years of marriage duration

Contraceptive users	Low (Zero)		Medium (1-3)		High (4-6)		Total	
	Frq.	%	Frq.	%	Frq.	%	Frq.	%
Users	3	15.0	5	50.0	22	71.0	30	49.2
Non Users	17	85.0	5	50.0	9	29.0	31	50.8
Total	20	100.0	10	100.0	31	100.0	61	100.0

$\chi^2 = 15.0486$, $df = 2$, $P < 0.05$

6-10 years of marriage duration

Contraceptive users	Low (Zero)		Medium (1-3)		High (4-6)		Total	
	Frq.	%	Frq.	%	Frq.	%	Frq.	%
Users	25	51.0	14	82.3	30	71.4	69	63.9
Non Users	24	49.0	3	17.7	12	28.6	39	36.1
Total	49	100.0	17	100.0	42	100.0	108	100.0

$\chi^2 = 7.0229$, $df = 2$, $P < 0.05$

11-15 years of marriage duration

Contraceptive Users	Low (Zero)		Medium (1-3)		High (4-6)		Total	
	Frq.	%	Frq.	%	Frq.	%	Frq.	%
Users	29	61.7	18	75.5	27	84.4	74	71.8
Non Users	18	38.3	6	25.0	5	15.6	29	28.2
Total	47	100.0	24	100.0	32	100.0	103	100.0

$\chi^2 = 5.0316$, $df = 2$, Not Significant

16 and above years of marriage duration

Contraceptive users	Low (Zero)		Medium (1-3)		High (4-6)		Total	
	Frq.	%	Frq.	%	Frq.	%	Frq.	%
Users	47	54.0	29	70.7	29	80.6	105	64.0
Non Users	40	46.0	12	29.3	7	19.6	59	36.0
Total	87	100.0	41	100.0	36	100.0	164	100.0

$$\chi^2 = 8.8844, \text{ df} = 2, \text{ P} < 0.05$$

TABLE 8
Educational level and spacing of children as reported by eligible respondents

Last pair

Spacing of children (in months)	Low (zero)		Medium (1-3)		High (4-6)		Total	
	Frq.	%	Frq.	%	Frq.	%	Frq.	%
<12	—	—	—	—	2	2.5	2	0.6
12 – 23	36	22.2	12	17.9	21	26.6	69	22.4
24 & Above	126	77.8	55	82.1	56	70.9	237	77.0
Total	162	100.0	67	100.0	79	100.0	308*	100.0

Second Last pair

Spacing of children (in months)	Low (zero)		Medium (1-3)		High (4-6)		Total	
	Frq.	%	Frq.	%	Frq.	%	Frq.	%
<12	—	—	—	—	—	—	—	—
12 – 23	25	15.1	11	16.7	21	27.3	57	18.5
24 & Above	140	84.9	55	83.3	56	72.7	251	81.5
Total	165	100.0	66	100.0	77	100.0	308*	100.0

*Four respondents were unable to determine the ages of their children.

Results

Age distribution of respondents (n = 436) showed that most of them were between the ages of 26-30 years (29.6%) followed by 31-35 years (24.1%) and 36-40 years (20.1%). The proportion below 25 and above 40 years was quite small. This showed that more than 3/5th of them were in a period of high reproductive potential (Table 1).

The educational level of respondents showed that 46.6% of them had never been to school, 10.3% had schooling up to grade 8, 10.8% were

matriculate, whereas 32.3% had college education (Table 2).

Regarding the category of respondents based on education they were divided into low, medium, and high according to their scores. 46.6% belonged to low, 21.1% to medium, and 32.3% high-level category (Table 3).

Relationship between educational level and fertility indicates that 48.3% of the low, 36.9% of the medium, and only 5.7% of high educational level had 5 or more children (Table 4). Duration of

marriage is an important factor affecting the fertility of women. It may be appropriate to introduce this variable as a control factor and see whether or not the relationship persists. Association between two variables in the category of marriage duration 5 years was not present. On the other hand at the marriage duration category of 6-10 years, 11-15 years, and 16 years and more the association has been very strong as seen by the chi-square value (Table 5).

It was observed that 51.2% of low, 71.1% of medium, and 75.6% of high educational level women were using contraceptives. Chi-square value shows a very strong association between educational level and use of contraceptives (Table-6). The marriage duration categories were divided by five years intervals. In each marriage duration category there was substantial increase in the percentages of contraceptive users along with the increase in the educational level. This inference is further supported by chi-square value calculated within each category of marriage duration (Table-7).

For calculating the spacing between the last two pairs of pregnancies (i.e.: last three pregnancies) only 312 respondents were eligible (has 3 or more children). Out of 312, four respondents were unable to determine the ages of their children so they were excluded and analysis was done on remaining 308 cases (Table-8). By controlling their marriage duration it was found that most of the respondents were well closer to the minimum recommended spacing period (2 years or more) between the pregnancies.

Discussion

The findings of the study clearly indicate an inverse relationship between the educational level and the fertility. There have been clear indications that at lower levels of education a great proportion of women respondents were having a large number of children, i.e., 5 or more compared with their corresponding counterpart at middle and higher level of education. These findings were consistent with many other studies (4-8).

The genuineness of the relationship was verified by plugging in a third variable of marriage duration as a control factor. The marriage duration

suppressed the strength of association in the category of 5 years or less, but strong association persisted in 6-10 years, 11-15 years, and 16 years and more categories. Such results that no effect of education on fertility during first five years is expected in Pakistani socio cultural milieu where the couples are under some "social pressure" to prove their manhood/ womanhood by having children.

In order to see the relationship between the level of education and spacing of children, last two pairs of pregnancies were taken into consideration. From total respondents only 308 were eligible to provide information since most of the respondents were closer to their minimum recommended spacing period between pregnancies. There was a weak relationship between educational level and spacing of their pregnancies. Nevertheless one could say that there were a relatively greater proportion of women in low educational level category compared with the high educational level category of women who had spacing of twenty-four months or more of the last two pairs of children. It is expected that such a difference may have been the outcome of breast-feeding that is supposedly a practice of greater proportion in low educational level women than by their counterpart. Amongst the high educational level category one could expect an emerging trend (usually have found in technologically advance countries) of relatively closer pregnancies.

It is found that there is a quite significant change in the percentages of contraceptive users as one moves from lower educational level to medium and high. These findings supports earlier findings reported by Greenspan. (5)

When variable of marriage duration was introduced as a control factor it is observed that strength of association as indicated by chi-square is higher at high marriage duration categories, which is understandable in Pakistani culture.

These findings suggest that level of education can rationalize the fertility behaviour because women are likely to have more information about planning of families, use of contraceptives, and spacing of children. They can logically convince their husbands about planning of their families

because education may increase communication between couples and enable women to take decision and to implement it as far as different aspect of her life are concerned.

Conclusion

The level of education and use of contraceptives were seen to be directly associated. Educational process helps the women by raising age at marriage, awareness about contraceptives, decision making about the use of contraceptives, and ultimately the number of children. So it reveals that higher level of education enables women to make decision about their parity and many other related aspects of life.

Keeping in view the strong and statistically significant association of educational level and fertility behaviour, it can be recommended that high emphasis should be placed on female education, and provision of opportunities and incentives to raise the level of education among females.

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FREQUENCY OF IRON DEFICIENCY ANAEMIA IN PREGNANCY

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SUMMARY

Haemoglobin concentration, haematocrit and red cell indices were used to assess the prevalence of iron deficiency anaemia in 103 pregnant women attending Lady Atchison Hospital, Lahore. Iron deficiency anaemia was present in 41.75% based on Hb less than 11g/dl in addition to abnormal haematocrit and red cell indices. Lower mean values for Hb concentration were obtained in women in the 2nd (10.1 g/dl) and 3rd (9.6 g/dl) trimester of pregnancy indicating decreasing iron stores. Anaemia prevalence was directly related to the number of previous pregnancies. It increased with parity being 92% in grand multigravidae and 25% in primigravidae indicating that grandmultiparous women were particularly at risk. The prevalence of anaemia remained high (65.06%) in low-income women suggesting poor iron nutrition both before and during pregnancy in this group. The higher prevalence of anaemia among the pregnant women (41.75%) and among women during the third trimester (64%) suggests that these groups are at a greater health and nutrition risk. It is possible that early detection and enrolment in Public Health Programme may improve iron nutrition status during pregnancy and reduce poor pregnancy outcomes.

Introduction

Iron deficiency is the most common form of nutritional deficiency world wide (1) Its prevalence is highest among children and women of child bearing age (2) In children iron deficiency causes developmental delays and behavioral disturbances (3, 4) and in pregnant women it increases the risk for a preterm delivery and delivering a low-birth weight baby (5) Among pregnant women, iron deficiency anaemia during the first two trimesters of pregnancy is associated with a two fold increased risk for preterm delivery and a three fold increased risk for delivering a low birth weight baby (6) Evidence from randomized control trials indicates that iron supplementation decreases the incidents of iron deficiency anaemia during pregnancy (7-9) but trials of the affect of universal iron supplementation during pregnancy on adverse maternal and infant out comes are inconclusive (10,11)

Maternal anaemia results in intrauterine growth retardation, increased prenatal mortality and increased maternal morbidity and mortality. In developing countries, severe anaemia is the main

causal factor in upto 20% of maternal deaths (12) In Pakistan the rate of anaemia among women during pregnancy is high and no improvement has been noted since the last two decades (13). Even in developed countries such as the United States iron deficiency continues to warrant significant public health concern because approximately 5% of children and 5-10% of women of child bearing age are effected by iron deficiency (14) Moreover, 20-30% of low income pregnant women in the United States have iron deficiency anaemia during the third trimester (15) The high prevalence of iron deficiency world wide is largely the result of dietary iron intake that is inadequate to meet the relatively high iron requirements of early childhood and the reproductive years. Currently, there are two major approaches to improve iron nutrition, providing iron supplements to at risk people such as pregnant women and increasing the iron content of the diet for whole populations by fortifying selected food products. Our intentions were to determine the incidence of the association of anaemia in pregnancy and to examine the development of effective approaches to prevent and control of iron deficiency anaemia in women of child bearing age especially pregnant women.

Materials and Method

The study was conducted to investigate the proportion of anaemia in pregnant women attending the antenatal clinic of Lady Aitchison Hospital, Lahore. The study extended over a period of 1 month. Lady Aithison Hospital is a maternity and gynae hospital situated in a populous area in the center of the city. It is being visited by women of all social classes. It is attached to Postgraduate Medical Institute of Punjab. Two days per week are fixed for the visit of antenatal women. Approximately one hundred pregnant women attend each antenatal day. Every 10th pregnant women attending the antenatal days was examined carefully. A complete history of each pregnant women was recorded, regarding any abnormal bleeding, antenatally, intranatally and post-natally and any untoward hospitalization regarding blood transfusion etc. History of piles, worms were also asked which could result in or aggravate her iron depletion, leading to iron deficiency anaemia. Age, gestational week, parity nutritional standard socio-economic status of each female was also recorded. Blood sample of each pregnant woman was taken and screened for haemoglobin concentration, haematocrit and red cell indices.

Sample persons were classified as anaemic by comparing their measured haemoglobin values to standard cut-off values proposed by WHO (16).

Results

Data on Hb concentration in 103 pregnant women is shown in Table-I. The mean haemoglobin concentration was 10.60 ± 1.08 g/dl with a range of 7.6 – 12.4g/dl. Cases were divided into 5 classes with the class interval of 1 gram each. Group I included 3 cases with Hb range of 8.1 – 9.0g/dl. Group II comprised of 9 cases, with mean haemoglobin concentration of 8.7 ± 0.24 g/dl. Group III had 24 cases, with mean Hb concentration of 9.7 ± 0.25 g/dl. Group IV with 24 cases had mean Haemoglobin concentration of 10.9 ± 0.27 g/dl. Group V with mean haemoglobin concentration 11.5g/dl had maximum number of cases. Presence of severity of anaemia was categorized according to standards set by WHO (16).

Anaemia was present in 43 cases constituting 41.75% of the total cases (Table-II). In order to further investigate iron deficiency anaemia, haematocrit value was determined (Table-III). The packed cell volume (PCV) ranged from 26 – 45% with mean 27.8 ± 5.4 %. Examination of blood for PCV estimation tells about the number of RBCs present in the sample per 100ml of blood measuring thereby that in case of anaemic subjects PCV would be less. The degree of anaemia is indirectly proportional to the value of PCV i.e. higher the value of PCV, lesser the anaemia. Table-III shows the relationship of PCV with haemoglobin levels. It revealed that cases with higher values of haemoglobin concentration have higher value of PCV. In our study 43 cases had PCV below 36%, further confirming high proportion of iron deficiency anaemia in 41.75% of cases.

Relationship between haemoglobin and MCHC was also studied (Table-V). The MCHC value ranged from 25.66% to 31.35% with mean value of 29.44%. With increasing range of haemoglobin level in pregnant women under study, the MCHC value increases, being 27.00 ± 2.1 % in Group I with haemoglobin concentration range of 7.1 ± 8.0 g/dl of blood to 31.3 ± 5.2 % in Group V with haemoglobin concentration range 11.1 to 12.0g/dl. Haemoglobin concentration was also investigated during different trimesters of pregnancy. Table VI shows the relationship of haemoglobin concentration with various trimesters of pregnancy in 103 cases. 4 women were in 1st trimester of pregnancy with mean haemoglobin concentration of 11.4 ± 0.87 g/dl. 31 women were in 2nd trimester with mean haemoglobin concentration of 11.0 ± 1.41 g/dl. Whereas 68 cases were in 3rd trimesters with mean haemoglobin concentration of 10.3 ± 2.14 g/dl. Women of all parities were examined in the study (Table-VII). Primigravida were largest in number among 103 pregnant women, constituting 41% of total cases with mean haemoglobin level of 10.9 ± 1.37 g/dl. Women of 2nd gravida have mean haemoglobin concentration of 11.0 ± 1.04 g/dl, while women of gravida 5 and above had mean haemoglobin concentration of 9.5 ± 0.84 g/dl. It was observed that as the parity increases the haemoglobin concentration decreases resulting in anaemia.

The effect of socio-economic status on prevalence of anaemia was studied. The cases were divided into 3 socio-economic groups (Table-VIII). Group I with monthly income of Rs.1500-3000 included 49 cases with mean haemoglobin concentration of 9.7g/dl. Group II with monthly income of Rs. 3100-4500 had mean haemoglobin concentration of 10.9g/dl. Group III with monthly income of Rs. 4500 had mean haemoglobin concentration of 11.46g/dl.

Discussion

Iron deficiency and iron deficiency anaemia are prevalent among pregnant women. The extent to which iron deficiency affects maternal and neonatal health is uncertain. Existing data suggest that maternal iron deficiency anaemia may be associated with adverse outcomes, including preterm delivery and higher maternal mortality. (5,13) Anaemia in pregnancy is a common major health problem in developing and developed countries. In a collaborative study involving seven Latin American countries iron deficiency was present in 48% of pregnant women as compared with 21% of non-pregnant women (17) In the countries of Eastern Mediterranean Region, the prevalence of anaemia in pregnant women is 50%(12).

The prevalence rate of anaemia in Pakistani pregnant women was estimated to be 43-47% and no improvement has been noted since the last two decades (13). The results of haemoglobin indicating anaemia were found in 41.75% of pregnant women in our study. Haemoglobin concentration in this population sample ranged from 7.6 to 12.4g/dl and 2.3% were found to have moderate anaemia, defined as a haemoglobin concentration below 8g/dl(16). In order to further screen for iron deficiency, haematocrit (PCV) was determined. Haemoglobin concentration and haematocrit reflect the amount of functional iron in the body. Haematocrit indicates the proportion of whole blood occupied by the red blood cells; it falls only after the haemoglobin concentration falls (18). In our study haematocrit declined in pregnant women with low haemoglobin

concentration, further confirming the high proportion of anaemia in these cases.

Concentration of haemoglobin and degree of anaemia was also studied in relation to different trimesters of pregnancy. It was observed that haemoglobin concentration decreased with increasing gestational age. So the pregnant women were more anaemic in their 3rd trimester (mean Hb concentration 9.6g/dl) as compared to 1st and 2nd trimester (mean Hb concentration 11.0g/dl & 10.1g/dl respectively).

As iron is being consumed and lost during delivery, it takes time for its restitution (19) Pregnancy and delivery exhaust the organism. It takes time for the recovery and for a new pregnancy. Therefore we also examined in what way the number / time interval may affect anaemia. Low haemoglobin concentration (mean 9.5g/dl) was countered in grand multipara indicating frequent pregnancies as one of the causes of anaemia. The occurrence of anaemia in pregnancy is related to the socio-economic status of the women. It influenced the degree of anaemia through nutrition. The poor nutritional status of women of child-bearing age is a special cause of anaemia, Multiparous women of the lower socio-economic class were found to have the highest risk of anaemia (15) In our study anaemia increased with decreased socio-economic status from 11.4g/dl in upper middle socio-economic to 9.7g/dl in the lower middle socio-economic class indicating that socio-economic status had effect on maternal anaemia. The results of the present study were consistent with previous studies (15,14).

Iron deficiency is seen commonly in women during their reproductive years and particularly during pregnancy. The association of poor pregnancy outcome is of concern when iron deficiency is present in the first trimester. It is recommended that pregnant women receive nutritional assessment and prenatal care along with adequate iron supplementation to potentially decrease the risk of poor pregnancy outcome.

TABLE -I
Haemoglobin Concentration in 103 Pregnant Women

Group	Haemoglobin conc.(g/dl)	Mean Hb.Conct. G/dl SD	Number of cases	Percentage of total cases
I	7.1-8	7.6 ± 0.11	3	2.91
II	8.1-9	8.7 ± 0.24	9	8.74
III	9.1-10	9.8 ± 0.25	24	23.30
IV	10.1-11	10.9 ± 0.27	24	23.30
V	11.1-12	11.5 ± 1.00	43	41.75
Total			103	100.00

TABLE-II
Prevalence of Anemia in 103 Pregnant Women

Hb Concentration	Number of cases	Percentage of total cases
11 g/dl	43	58.25
11 g/dl	60	41.75
Total	103	100.00

TABLE-III
Relationship between Packed Cell Volume (PCV) and Haemoglobin concentration

Group	Haemoglobin conc.(g/dl)	Mean PCV(%) SD	Number of cases	Percentage of total cases
I	7.1-8	27.33 ± 1.00	3	2.91
II	8.1-9	30.33 ± 1.45	9	8.74
III	9.1-10	33.41 ± 1.80	24	23.30
IV	10.1-11	35.95 ± 3.07	24	23.30
V	11.1-12	38.51 ± 2.34	43	41.75
Total			103	100.00

TABLE-IV
Relationship between Haemoglobin and mean corpuscular Haemoglobin concentration (MCHC)

Group	Haemoglobin conc.(g/dl)	MCHC(%) SD 25.00	Number of cases	Percentage of total cases
I	7.1-8	27.00 ± 2.1	3	2.91
II	8.1-9	25.66 ± 1.8	9	8.74
III	9.1-10	26.83 ± 2.02	24	23.30
IV	10.1-11	30.33 ± 2.17	24	23.30
V	11.1-12	31.35 ± 2.0	43	41.75
Total			103	100.00

TABLE-V
Haemoglobin Concentration during different Trimesters of Pregnancy

Duration of Pregnancy	Mean Hb Conc. (g/dl)	Number of cases	Percentage of total cases
1st Trimester	11.4 ± 0.87	04	3.88
2nd Trimester	10.1 ± 1.41	31	30.11
3rd Trimester	10.3 ± 2.14	68	66.01
Total		103	99.00

TABLE-VI
Relationship between Parity and Haemoglobin Concentration

Parity	Mean Hb Conc. (g/dl)	Number of cases	Percentage of total cases
Primigravida	10.9 ± 1.37	43	41.75
Gravida II	11.0 ± 1.04	14	13.59
Gravida III	10.5 ± 2.14	22	21.36
Gravida IV	10.1 ± 1.27	11	10.68
Gravida V	9.5 ± 0.84	13	12.62
Total		103	100.00

TABLE-VII
Relationship between Haemoglobin Concentration and Socio-economic status

Monthly income (Rs.)	Mean Hb Conc. (g/dl)	Number of cases	Percentage of total cases
1500 3000	9.7	49	47.57
3100 4500	10.9	26	25.24
+ 4500	11.4	28	27.19
Total		103	99.00

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HYPERGLYCEMIC EFFECT OF HIGH DOSES OF DICLOFENAC (VOLTAREN) IN RABBITS

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SUMMARY

The present study was carried to record the effect of diclofenac (Voltaren) on blood sugar level in rabbits. Various doses of the drug were given to various groups of rabbits and blood sugar level was seen after 1 hour, 3 hours, and 24 hours. A long-term study was carried out on a group of rabbits in which the drug was given daily and blood sugar level was recorded after 1 week, 2 weeks, and 4 weeks. The study was carried out at the laboratory of Fatima Jinnah Medical College, Lahore, in one year time. Blood sugar level was estimated by using glucose kits GOD/PAP supplied by Randox Lab. Method was calorimetric without deproteinization¹⁻⁵. The study showed that there was a significant increase in blood sugar level at 1 hour, 3 hours, and 24 hours interval after injection of various doses of diclofenac. The long-term study revealed that blood sugar level significantly increased after diclofenac.

Introduction

Rheumatic complaints are amongst the most common reasons for seeing a doctor especially in middle aged people. Millions of dollars worth of non steroidal anti-inflammatory drugs (NSAIDs) consequently being prescribed to fill an almost insatiable demand. Considerable number of the patients in this age group are suffering from mild moderate or severe diabetes or are prediabetic (Latent diabetes).

Diclofenac or (Voltaren) is one of these NSAIDs which is quite popular now-a-days and is prescribed extensively in this age group. The present study was designed to see the hyperglycaemic effect of various of doses of Diclofenac in experimental animals, rabbits in our study.

It was aimed to provide useful information and guideline for correct choice in clinical use of this drug in patients who are prediabetic or suffering from diabetes, as hyperglycemic effects could worsen already existing diabetes or precipitate diabetes and be one of the factors for or poor response to antidiabetic drugs.

Materials and Methods

Rabbits were weighed ranging from 0.6-1.1Kg. Six rabbits were used in each group. Blood sugar level was estimated by drawing 2ml of blood from the ear vein of the rabbit. Blood was centrifuged for about 10 minutes to 15 minutes at 4000 RPM and clear plasma was obtained. Blood sugar level was estimated by using glucose kits GOD/PAP.

The principle of the method is to determine glucose after enzymatic oxidation in the presence of glucose oxidase. The formed hydrogen peroxide reacts under catalysis of peroxidase with phenol and 4-aminophenazone to form a red-violet quinone-nine as indicator.

Reagents used from the supplied kit were:

1. Buffer solution
2. GOD-PAP reagent
3. Standard solution

In procedure micropipette was used. 20 μ l of the plasma was put in all the tubes for blood sugar estimation. These were labelled as "tests". 2 μ l of the standard solution was put in one of the tubes and was labelled as "standard". One test tube was

labelled for blank. The 2ml or 2000 μ l of the prepared reagent was put in all the rest tubes i.e. those having sample, test, and blank labels.

Then they were mixed and incubated for 10 minutes at 37°C. The absorbance of the standard (A standard) and sample, was measured against the reagent blank within 60 minutes. the wavelength selected was 546nm.

The calculations were done as follows:

$$\text{mg\%} = \text{A sample} \times \frac{100}{\text{A standard}}$$

Normal range of values were taken as 75-115 mg%.

Readings were taken as follows:

For Short-term Study

Group-I

- i. Normal blood sugar level was taken in this group of six rabbits and was taken as a control.
- ii. Therapeutic dose of Diclofenac 1.07mg/Kg was then injected deep I/M.
- iii. Blood samples were drawn after injection of the drug at an interval of 1 hour, 3 hours, and 24 hours.

Group-II

In this group of six rabbits dose of the drug injected was double the therapeutic dose i.e. 2.14mg/Kg I/M. Sample for blood sugar estimations were taken at the same intervals i.e. 1 hour, 3 hours, and 24 hours.

Group-III

In this group of six animals the dose of the drug injected was four times the therapeutic dose i.e. 4.28mg/kg I/M and blood sugar levels were determined at the same intervals i.e. after 1 hour, 3 hours and 24 hours.

For long-term study

Group-IV

In this group of six rabbits, the dose selected was the third dose i.e. 4.28mg/Kg I/M. It was injected daily for a period of 4 weeks. Blood sugar level was determined at the end of every week for 4 weeks.

Statistical Analysis

Statistical analysis of the results was done, Standard Deviation, Standard Error and 't' test were calculated. If 't' value is greater than 2 times, the results were significant.

Results

In the first group a therapeutic dose of 1.07mg/Kg of diclofenac was used. Mean blood sugar level before giving diclofenac was 100.89 $\pm$ 2.23mg%. Blood sugar level after one hour of inj. was 143.06 $\pm$ 11.42mg%. Blood sugar after 3 hours of inj. was 164.36 $\pm$ 4.04mg%. Blood sugar level after 24 hours of inj. was 135.33mg $\pm$ 8.39mg% (Table-I). All the results are highly significant ($p < 0.001$).

In the second group with double the therapeutic dose (2.14mg/kg). Mean blood sugar level before injection was 135.1 $\pm$ 2.62mg%. Blood sugar levels one hour after diclofenac injection was 197.88 $\pm$ 4.06mg%. Blood sugar level after 3 hours of inj. was 186.93 $\pm$ 7.43mg%. Blood sugar level after 24 hours of inj. 172.5 $\pm$ 6.71mg% (Table-II). All the results are highly significant ($P < 0.001$).

In the third group diclofenac was given in a dose of 4.28mg/kg i.e. four times the therapeutic dose. Mean blood sugar level before giving the inj. was 97.06 $\pm$ 0.29mg%. Blood sugar level 1 hour after the inj. of drug was 165.22 $\pm$ 15.29mg%. Blood sugar level 3 hours after the inj. of drug was 137.48 $\pm$ 12.49mg%. Blood sugar level 24 hours after inj. was 117.3 $\pm$ 11.47mg% (Table-III). All the results are highly significant $p < 0.001$.

In the fourth group dose of drug was kept same as in 3rd group (i.e. 4.28mg/kg of diclofenac daily) Mean blood sugar level before inj. was 97.06 $\pm$ 0.291mg%. Blood sugar level at the end of first week was 195.88 $\pm$ 28.99mg%. Blood sugar level at the end of second week was 172.46 $\pm$ 28.66mg%.

Blood sugar level at the end of 3rd week was 161.88 $\pm$ 17.09mg %. Blood sugar level at the end of 4th week was 158.68 $\pm$ 11.50 mg % (Table-IV). All the results are highly significant ($P < 0.001$).

TABLE-I
First Group
 Blood sugar level after I/M Inj. Diclofenac (1.07mg/Kg the therapeutic dose)
BLOOD SUGAR LEVELS (in mg%) AFTER

S.No.	Weight of animal	Normal BSL mg	Dose	1 hr	3 hrs	24 hrs
1	0.6 Kg	106.15	Therapeutic dose	156.3	174.5	107.6
2	0.79 Kg	97.69		114.09	172.7	118.09
3	10.07 Kg	90.23		106.0	160.0	135.6
4	1.07 Kg	93.84		180.0	153.0	155.14
5	1.13 Kg	108.46		153.0	172.0	160.6
6	0.71 Kg	100.00		149.0	154.0	135.33
	MEAN	100.89		143.06	164.36	135.33
	SD	5.44		27.88	9.85	20.48
	SE	62.23		611.42	64.04	68.39
	t value			7.50	25.38	10.56
	P value			<0.001	<0.001	<0.001

TABLE-II
Second Group
 Blood sugar level after I/M Inj. Diclofenac (2.14 mg/Kg double the therapeutic dose)
BLOOD SUGAR LEVELS (in mg%) AFTER

S.No.	Weight of animal	Normal BSL mg	Dose	1 hr	3 hrs	24 hrs
1	1.19 Kg	172mg	2.14 mg/kg	211	135	164
2	0.68 Kg	107.5		177	184	223
3	1.25 Kg	141.7		198.4	180	212
4	1.36 Kg	140.6		188.7	154.9	130
5	1.36 Kg	147.05		231.8	238.7	156
6	1.36 Kg	142.1		180.39	229	150
	Mean	135.1		197.88	186.93	172.5
	SD	6.42		9.94	18.14	16.45
	SE	42.62		64.06	67.43	66.71
	t value			24.33	16.35	12.26
	P value			<0.001	<0.001	<0.001

TABLE-III
Third Group
 Blood sugar level after I/M Inj. Diclofenac (4.28mg/Kg 4 times the therapeutic dose)
BLOOD SUGAR LEVELS (in mg%) AFTER

S.No.	Weight of animal	Normal BSL mg	Dose	1 hr	3 hrs	24 hrs
1	1.53 Kg	101.03	4.28mg	190.6	149.38	119.42
2	0.96 Kg	90.47	per Kg	180.15	130.2	110.68
3.	0.68 Kg	84		131.88	126.53	168.96
4.	0.90 Kg	103		123.69	162.04	117.93
5.	0.96 Kg	97.41		219.37	105.71	100.34
6.	0.79 Kg	106.45		145.67	151.02	86.53
	Mean	97.06		165.22	137.48	117.31
	SD	8.4		37.46	30.59	28.109
	SE	ñ0.291		ñ15.29	ñ12.49	ñ11.47
	t value			17.29	11.30	5.90
	P value			<0.001	<0.001	<0.001

TABLE-IV
Fourth Group Long Term Study
 Blood sugar level after I/M Inj. Diclofenac (4.28 mg/Kg the therapeutic dose daily for 4 weeks)
BLOOD SUGAR LEVELS (in mg%) AFTER

S.No.	Weight of animal	Normal BSL mg	Dose	1 Wks	2 Wks	3 Wks	4 Wks
1	1.53 Kg	101.03	4.28 mg	100.0	103.22	112.23	122.84
2	0.96 Kg	90.47	per kg	202.6	84.4	182.27	134.48
3.	0.68 Kg	84		154.22	198.38	227.42	166.37
4.	0.90 Kg	103		169.7	239.91	155.27	177.58
5.	0.96 Kg	94.41		299.1	155.24	169.62	151.72
6.	0.79 Kg	106.45		249.7	253.62	124.47	199.13
	Mean	97.06		195.88	172.46	161.88	158.68
	SD	8.4		71.00	70.219	41.66	28.18
	SE	ñ0.291		ñ28.99	ñ28.66	ñ17.09	ñ11.50
	t value			18.26	14.01	15.58	17.94
	P value			<0.001	<0.001	<0.001	<0.001

Discussion

Diclofenac (Voltaren) is a phenylacetic acid derivative that is a potent inhibitor of Cox (cyclo oxygenase). As such it possesses analgesic, anti-inflammatory and antipyretic effects. It is used for rheumatoid arthritis osteoarthritis as well as ophthalmic preparation of the drug.

Although as a group NSAID are remarkably safe to use but it has been demonstrated in man and animals that large doses of salicylates may induce hyperglycemia, glycosurea and deplete liver and muscle glycogen. These effect may partly be explained by release of adrenaline. In these doses there is decrease in aerobic metabolism of glucose, increase activity of glucose 6-PO4 and increase secretion of glucocorticoid (Goodman and Gillman 1990).

It has been reported by Prescott (1986) that use of diclofenac may be associated with some increase risk of aplastic anaemic or impaired liver function; periodic tests for hepaic function are recommended.

Although in case of diclofenac sufficient literature is not available about its hyperglycemic effect but

this experimental study strongly suggest that there is possibility of developing hyperglycemia in those patients with rheumatic complaints like rheumatoid arthritis, who are taking high doses of this analgesic for long durations. Therefore some other analgesic should be given in such cases. Since the present study was carried out on rabbits, it may be applied on human population with caution.

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ASSESSMENT OF THE BASIC ESSENTIAL OBSTETRIC CARE AT FIRST LEVEL CARE FACILITIES IN LAHORE DISTRICT

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SUMMARY

A cross sectional survey of the First Level Care Facilities (FLCFs) was carried out for assessing the third delay i.e. delay due to the absence of suitable services at FLCFs and to find out the adequacy of existing health services in Public Sector for Basic Essential Obstetric care (BEOC) according to WHO / UNICEF standards. 3 RHCs & 9 BHUs were randomly selected for the survey. Data was collected through questionnaire based interview of the health personnel and past six months record of the health facility. The study clearly identified that the infrastructure was in place. At RHC and BHU level some of the posts of WMOs, LHV & Dais were lying vacant against the sanctioned posts. Availability of essential drugs was 90% at the selected RHCs & 60% at BHUs. All RHCs were providing services round the clock, while BHUs were open from 0800 to 1400 hours. During last 6 months all the cases of normal deliveries coming to RHCs were provided care. Two third of the complicated cases were attended and the rest were referred. Deliveries were not conducted at BHUs & all the cases were referred. Transport was available at all RHCs but not at BHUs. It was concluded that selected facilities do not qualify as BEOC. WMOs are not available round the clock in RHCs as they are not residing in the premises, the LHVs are residing in the premises but they provide services for normal deliveries & most of the complicated cases are being referred. Available facilities such as Labour rooms are fully equipped at RHCs but are not being properly utilized. No formal Labour rooms are available at BHUs. RHCs & BHUs do not have a regular supply of parenteral antibiotics, oxytocics & anticonvulsant drugs. Routine tests are being carried out at RHCs but their services need up gradation. No formal referral policy existed at all levels.

INTRODUCTION

Maternal mortality is estimated to be around 600,000 worldwide every year. More than half of these deaths occur in Asia. Pakistan lags behind most developing countries in women's health. Maternal mortality ratio (MMR) is around 350 per 100,000 live births (1). Moreover, one in 40 women die due to causes related to pregnancy. Trained health care providers assist only 20 % of women in Pakistan during delivery. The major causes of death during pregnancy in Pakistan are, Hemorrhage 21%, Sepsis 13.3%, unsafe abortion 11%, Hypertension of pregnancy 18.6% and others 36.1% (2). 70 % of the population of Pakistan is residing in rural areas, where women normally do not have access to health facilities

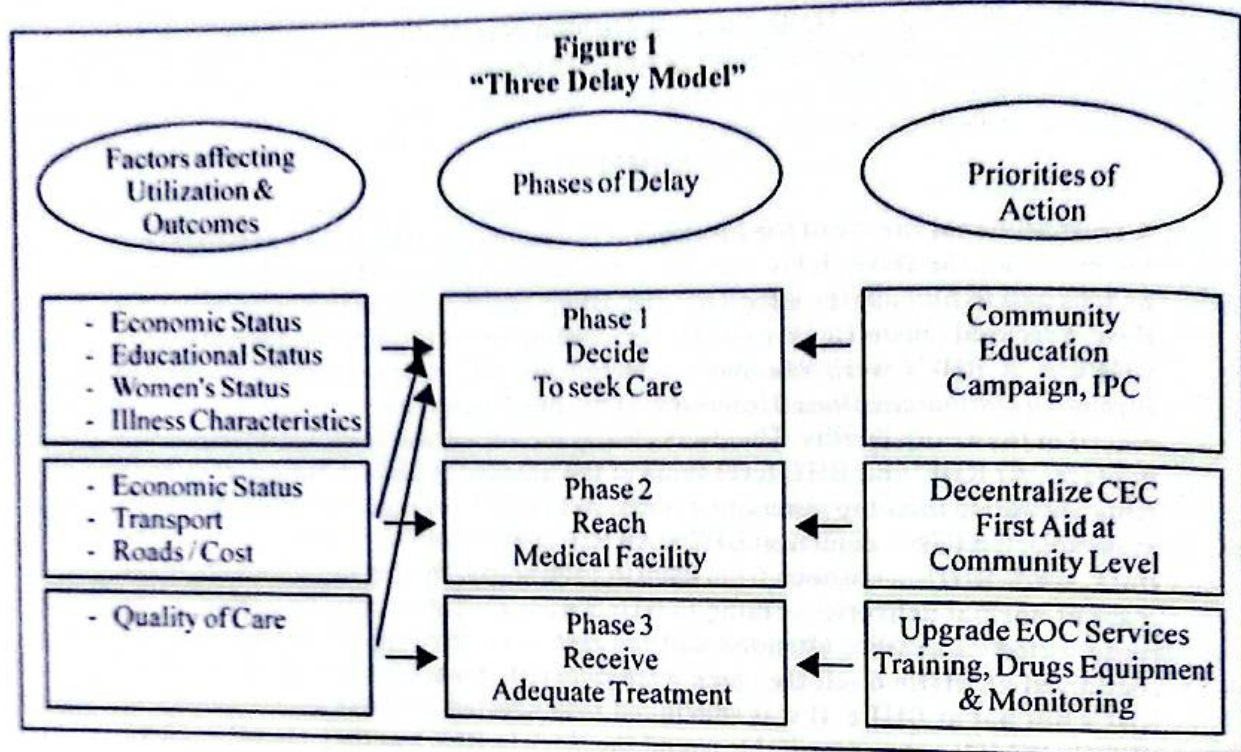
that can provide the basic and emergency obstetric care (3). Complications like excessive bleeding, sepsis, and obstructed labor can happen to any women at any time even if her physical conditions appear to be satisfactory. Thus complications of pregnancy have to be dealt immediately through Basic Emergency Obstetric Care (4).

There is definitely need of a fully functional system where normal deliveries can be conducted at home safely under supervision of skilled health care providers and if required the Basic Essential Obstetric Care (BEOC) is available within reach.

The access to health facilities offering (BEOC) is required for the screening, of high-risk pregnancies and management of complications.

The three-delay model is shown in figure 1. The three delays are commonly referred to as non-medical causes of maternal mortality. The

classical delays in getting care and preventing maternal deaths have been used to define the interventions needed (5).



The third delay is the delay due to absence of suitable services at the adequate level care facilities. The referral facility should be functional with facility of a blood bank, a functional operation theater, a well-equipped laboratory and a qualified gynecologist. The services should be available 24 hrs/day (6).

Third delay is the most critical in preventing maternal mortality. Best practices for improving EOC by international experts is not through expensive technologies, but through strengthening and upgrading existing health system to provide essential elements of obstetric Care to all those in need (7). Essential Obstetric Care (EOC) is the term used to describe the elements of obstetric care needed for the management of normal as well as complicated pregnancies, delivery and the post partum period. Essential obstetric care is therefore defined for different levels of the health care system Table. 1 lists the standards according to WHO/UNICEF giving the definitions of CEOC and BEOC.

In order to get an insight to maternal health services available in Pakistan it is essential to fully understand the Health care delivery system in the Country. In this context, the Basic Health Units (BHUs) can and should function as the first level Basic Essential Obstetric Care (BEOC) unit, and the Rural Health Center (RHC) as an advance (BEOC) and can be upgraded to become a Comprehensive Essential Obstetric Care unit (CEOOC).

It is believed that a good health infrastructure already exists and the strengthening of the first level Health care facilities can provide a strong support to the reduction / elimination of the third (Most Critical) delay.

The rationale for carrying out this study was to assess the current situation of Government health facilities in rural area in Lahore district and to identify gaps for improvement in BEOC.

Table 1

WHO/UNICEF Definitions of CEOC and BEOC

Basic Essential Obstetric Care (BEOC)	Comprehensive Essential Obstetric Care (CEOC)
1. Administer Parenteral Antibiotics	(1-6) All of those included in Basic EOC
2. Administer Parenteral oxytocic drugs	7. Perform surgery (Cesarean surgery)
3. Administer parenteral anticonvulsants for pre-eclampsia and eclampsia	8. Perform blood transfusion.
4. Perform manual removal of placenta	
5. Perform removal of retained products (e.g., manual vacuum aspiration)	
6. Perform assisted vaginal delivery	
A Basic EOC facility is one that is performing all of functions 1-6.	
A Comprehensive EOC facility is one that is performing all of the functions 1-8	

MATERIALS AND METHODS

Study design

A descriptive cross-sectional survey of the FLCFs for assessing the adequacy of these facilities for BEOC and to prevent the third delay i.e. delay in receiving treatment due to the absence of suitable services at the adequate level facility.

Study Population

Study population or sampling frame includes the First Level Care Facilities (FLCFs) of the rural areas of Lahore district. The facilities in the rural area are roughly within a radius of 30-40 Kms of the city center, having a total population of 994,556. There are a total of 6 RHCs and 37 BHUs in Lahore District

Sampling Technique

The health facilities were randomly selected in the rural area from the list of study population by lottery method. Out of the total 43 FLCFs (6 RHCs and 37 BHUs) 9 BHUs & 3 RHCs were selected.

Sample size

12 Government first level care facilities located in the rural area with in the jurisdiction of Lahore district.

DATA COLLECTION AND ANALYSIS

Data was collected with the help of questionnaire based interview and through past record. A data entry programme was developed on EPI INFO-6, a computer software and all the responses were entered in the programme and accordingly analysis was done by means of EPI INFO-6 programme.

FINDINGS AND ANALYSIS

BASIC STATISTICS

The health facilities selected for this study constituted three RHCs out of six and nine BHUs out of thirty-seven in district Lahore. These RHCs serve a total population of 303,399 with the RHCs serving an average of 28,277 each, and the BHUs serving an average of 24,296 (Standard Deviation 4,899). This indicated some spread between the populations served by the various BHUs.

STAFFING PATTERN

There is one sanctioned post of Medical Officer in each BHU. The doctors were available in eight out of nine BHUs. The RHC had a sanctioned strength of three doctors including a senior medical officer (In-charge of the facility) a male medical officer and a Woman medical officer. The post of Woman Medical officer in one of the RHCs was lying vacant. The maternity needs including Ante natal, delivery and postnatal requirements of the RHC were being met by two Lady health Visitors. None of the BHUs had a vacancy of a woman medical officer. The female health care provider was LHV or a Dai posted in the BHU. LHVs were available in 7 out of 9 BHUs & dais in 6 out of 9 BHUs. The

situation of the paramedic staff was not much encouraging. There was no theatre technician or dresser in the RHCs which were having well equipped theaters. Lab technicians and radiographers were available in only two of the three RHCs in the study.

Table 2

STAFF PROFILE IN THE BHUs UNDER STUDY

Name of staff	Vacancies Available	Vacancies Filled	% age
Medical Officer (MO)	9	8	88.89%
Lady Health Visitor (LHV)	9	7	77.78%
Medical Technician	9	4	44.44%
Mid wife	9	3	33.33%
Dai	9	6	66.67%
Dispenser	9	5	55.55%

Table - 3

STAFF PROFILE IN THE RHCs UNDER STUDY

Name of staff	Vacancies Available	Vacancies Filled	% age
Senior Medical Officer	3	3	100 %
Medical Officer (MO)	3	3	100 %
Woman Medical Officer WMO	3	2	66.67 %
Lady Health Visitor (LHV)	3	2	66.67 %
Med Asst/ Technician	6	2	33.33 %
Dai - (3 / RHC)	6	6	100 %
Dispenser	3	3	100 %
Lab Technician	3	2	66.67 %
Theatre Technicians	3	0	0 %

FACILITIES, EQUIPMENT & SERVICES AVAILABLE AT THE FLCFs

Facilities for obstetric care (Equipment and consumables)

The equipment for BEOC was available at all the three RHCs. However, at the BHUs it was partially available. The availability of equipment varied from one health facility to another between 45% - 70%. Protective clothing such as shoes and aprons were also not available at any of the BHUs.

Essential Drugs For Obstetric Care

The availability of drugs was considerably better as compared to that of the consumables. Essential drugs were available at two of the three RHCs. In one of the RHCs the drug supply situation was not satisfactory. A number of essential drugs such as Gentamicin, Aminoglycosides, Flagyl, Ferrous sulphate, folic acid, silver nitrate (eye drops) and Ergometrine injections were not available in stock. The condition was more or less the same in BHUs with drug availability ranging between 43 % to 60 %.

Laboratory Services for BEOC

Laboratory facilities were available in the RHCs to a limited extent to meet the requirements for BEOC. All three RHCs had the facility to check Hemoglobin, Blood sugar levels and Urine testing for Protein measurement. Whereas two of them also had facility for blood grouping and cross matching. However, none of the RHCs had the facility to perform renal function tests, liver function tests as well as coagulation profile during the past six months. The BHUs do not have the facility to perform laboratory investigations.

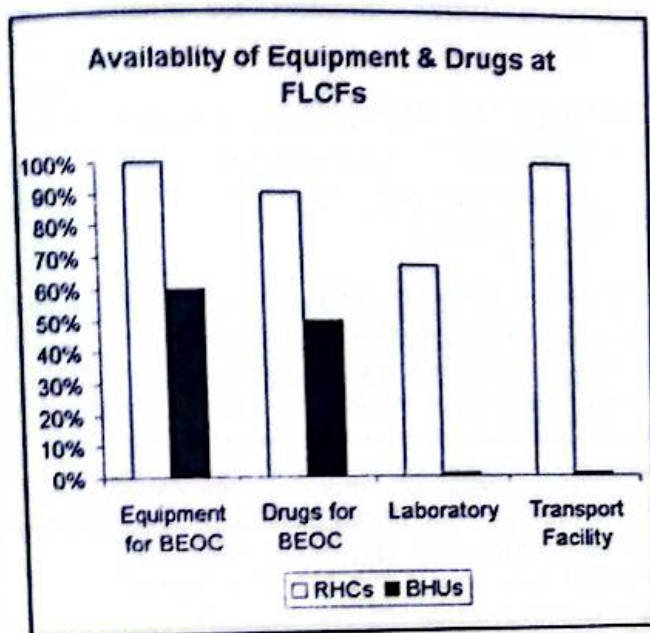
Facility for transportation of Emergencies

Functional ambulance service was available at all RHCs. None of the BHUs had an ambulance service.

Other Services

- ☐ Normal deliveries are being carried out at RHC level and not at the BHUs. 24 hour maternity services were available at only two RHCs. This facility was not available at any of

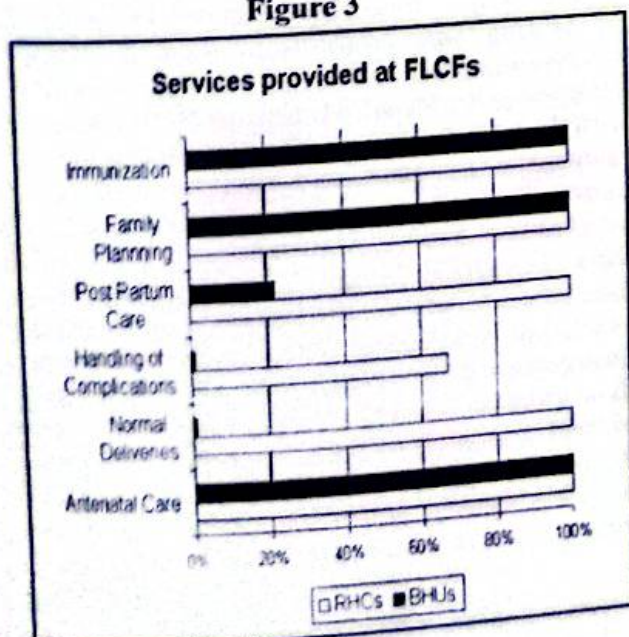
Figure 2



the BHUs;

- ❑ The RHCs had the facility for handling complications but this was not being used widely, and other than induced (I.V. Oxytocin) deliveries complications had been handled at only one location.
- ❑ Antenatal services, family planning services and immunization/vaccination (tetanus toxoid and BCG vaccines) were being provided by all facilities. This service was

Figure 3



maximally being used by the catchment population; and

- ❑ Postpartum care services were being provided by all RHCs and only two BHUs.
- ❑ Percentage of Services mentioned above is for those clients who reach the facility for care and not for the community as a whole.

DISCUSSION AND CONCLUSION

The total catchment area population of selected health facilities is 250,000. The RHCs are accessible by metalled roads and are located within 30 Kms of Lahore. The location of BHUs is not ideal i.e., in most of the cases they are located outside the community, which is reflected as poor utilization of these facilities. A study in India examined maternal mortality using new indicators. It found very low numbers of complications reaching the facilities, which "point to the need for encouraging families to use them (8). The medical officers were posted at all BHUs except for one. Majority of MOs commute daily from Lahore. In case of RHCs, the SMOs and other staff are residing in the residences provided within the health facility. The RHCs are providing services 24 hrs a day but in case of BHU, the facility is open from 0800 to 1400 hrs. The BEOC requires that the facilities are open round the clock, as complication of pregnancy can arise anytime(9). As far as the equipment is considered the selected health facilities had the basic minimum requirements however, the consumable items and stock position of essential drugs needs improvement. The simple drugs like Ferrous Sulphate and folic acid were out of stock in some facilities. These are management issues, which can be resolved easily. The laboratory services were only available at the level of RHCs, which require strengthening and up-gradation. The transport, which is an essential requirement of BEOC for timely referrals, is available at the RHCs only. Baluchistan Safe Motherhood Initiative BSMI showed reduction of maternal morbidity and mortality through community mobilization and training of TBAs by using wire less system (wakie talkie based) for timely referral of patients to the appropriate level of care and also arranging transport for avoiding delay (10).

Overall, 25% of selected health facilities are offering maternity care services. The management of complicated cases is only carried out at 8% of health facilities whereas, normal deliveries are conducted by 25% and antenatal care is provided by 100% of selected health facilities. The abnormally high third delay in these FLCFs i.e. failure to get treatment even after getting to the Center due to lack of adequate Consumables and drugs and non availability of Services 24 hours a day, had over the years led to a disillusionment in the community that they had failed to rely on the FLCFs for BEOC services. Another study conducted in Nepal concluded that Essential Obstetric Care (EOC) was seen as a key element of Safe Motherhood (11).

In order to meet WHO / UNICEF standards for BEOC the first level care facilities need up gradation by improving the staff presence, timing as well as their attitude and carrying out refresher trainings improving management and establishing linkages. In the new devolved setting and district health government, there are better chances of improving the system.

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AUTONOMOUS MEDICAL INSTITUTIONS (AMI) IN PUNJAB AN ASSESSMENT

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SUMMARY

Traditionally, the principals and Medical Superintendents, separately, headed the Medical Colleges and major Hospitals, respectively. Their roles and functions were supposed to be complimentary and supplementary to each other. The clinical teaching consultants were under the administrative control of the Principals, whereas they had major roles in the hospitals, which were managed by the Medical Superintendents. This fragmented management resulted in major administrative issues in the system with deficiency in the health care service delivery in the institutions. For example, it was a common complaint of the general public that consultants did not attend the patients in the wards, regularly, and the Medical Superintendent was unable to enforce discipline, as the consultants were not under his direct administrative control. Hence In view of the declining public confidence in the government health facilities, DOH undertook to analyze the situation and proposed interventions to remedy the situation. A number of departmental meetings and informal discussions at different fora were held to make improvements in care health management system. A concept document "Role Model Hospital" was introduced and discussed by the Department. The main idea behind the concept was that granting of administrative and financial autonomy to hospitals was required to address the prevailing situation. Groups with cross sectional representation in a high level meeting then discussed the concept in detail. The members of the group consisted of health and other professionals. The group recommended to the then Chief Minister of Punjab that decentralization and devolution of powers to the institutional level with modified governance structure, which later reflected in the Enactment.

INTRODUCTION:

The system was evolved through a consultative process. The process included concept development by the think tank of the Department of Health, in house brainstorming exercises, meetings of experts & professional representative organizations and workshops with participation from National and International Organizations. The amended and agreed document was vetted by the Law Department and promulgated as an ordinance. Later, after the discussion by the treasury and opposition benches Punjab Medical and Health Institutions, the Punjab Assembly approved Act in November 1998. This Act authorizes the Department of health to grant autonomy to the Medical Institutions.

POST AUTONOMY ORGANIZATIONAL SETUP:

Under this setup, it was proposed to devolve authority to an Institutional Management Committee (IMC) and appoint a Chief Executive (CE), as a superior management body over both the Principal of Medical College and Medical superintendent of the attached teaching hospitals. In this way, it was envisaged to effectively manage the resources and to ensure unity of the medical colleges and hospitals, who would continue to be headed by the Principal and Medical Superintendent, respectively, with enhanced administrative and financial powers.

Under the Punjab Medical and Health Institutions Act 1998, Department of Health, initially, granted autonomy to the Medical

Institutions in a phased manner. As a pilot following four Medical Institutions were given autonomy in phase I:-

- i) Jinnah Hospital & Allama Iqbal Medical College, Lahore.
- ii) Lahore General Hospital, Lahore.
- iii) Holy Family Hospital & Rawalpindi Medical College, Rawalpindi.
- iv) Punjab Institute of Cardiology (PIC), Lahore.

SELECTION OF CHIEF EXECUTIVES FOR PHASE I INSTITUTIONS:

The positions for Chief Executives of the four medical institutions were, widely, advertised in the National and International print and electronic media, to attract talented hospital/institution managers, through a transparent and merit based process. The response was very encouraging, especially, from within the country. A total number of 127 candidates applied for the positions.

The then Chief Minister, Punjab, thereupon constituted a committee with the following membership for the selection of the Chief Executives:-

1.	Chief Secretary, Punjab.	Chairman
2.	Secretary Health, Punjab	Member
3.	Khawaja Bilal Ahmed, Chairman export promotion	Member
4.	Justice @ Amir Raza Khan	Member
5.	Mr. Khushro Bakhtiar, MPA	Member
6.	Prof. Dr. Amir Aziz	Member
7.	Dr. Jehangir Alam	Member
8.	Mr. Tariq Hameed	Member
9.	Mr. Zafar Qureshi	Member

TERMS OF REFERENCE OF THE COMMITTEE:

- i) To develop and finalize criteria for selection of the Chief Executive and short listed applicants.

- ii) To recommend the names for the selection of Chief Executives to the Government for final approval
- iii) To propose and negotiate emoluments for the chief Executive of each particular institution.
- iv) To ensure fair and transparent selection process.
- v) Any other matter necessary to give effect to the selection of Chief Executive.

The committee prepared a panel. However, final selection was made by the then Chief Minister, Punjab. The following were nominated as Chief Executives:-

- i) Dr. Sabiha Khursheed, Lahore General Hospital
- ii) Lt. Gen. (R) Dr. Islam Hussain Naqvi, Holy Family Hospital, Rawalpindi.
- iii) Prof. Dr. Shehar Yar Sheikh, Punjab Institute of Cardiology, Lahore.
- iv) Prof. Dr. Amir Aziz, Jinnah Hospital, Lahore.

The newly appointed Chief Executives started working in July 1998.

THIRD PARTY EVALUATION

As a statutory requirement under the Act an independent third party was selected through open competition to conduct the audit of the autonomous institutions in the following areas:-

- ☐ Management
- ☐ Financial
- ☐ Clinical Issues

SELECTION PROCESS OF 3RD PARTY

The selection of the 3rd party was made on the following steps:-

- i) Development of Terms of Reference (TORs)
- ii) Widely advertised in the press
- iii) Evaluated on predetermined selection criteria

- iv) Selection by Provincial Consultant Selection Committee

Mssr, Anjum Asim Shahid and Company, an independent firm, was selected through this process.

3RD PARTY REPORT: AN ASSESSMENT OF AMI

Third party reported a clear evidence of improvements in governance and service indicators. The 3rd party report stated that visible improvements were noticed in the following areas: -

- i) Punctuality of staff.
- ii) Availability of Consultants in outpatients department.
- iii) Admission procedures.
- iv) Diagnostic services.
- v) General Cleanliness.
- vi) Repair & Maintenance of equipment.

THIRD PARTY ALSO RECOMMENDED IMPROVEMENT IN THE FOLLOWING AREAS:-

- a) System development, especially, Management Information System and Financial system.
- b) Protocol and procedures standardization for emergency handling.

The findings and recommendations of the 3rd party encouraged the policy makers to replicate autonomy to other institutions in the province.

Hence, in the next TWO PHASES autonomy was granted to the following institutions:-

A) PHASE-II

- i) Sheikh Zayed Hospital, Rahim Yar Khan

- ii) Bahawalpur Victoria Hospital & Quaid-e-Azam Medical College (QMC), Bahawalpur.

Names were invited from the GHQ. Out of the Panel Major General @ Dr. Ishtiaq Shah was selected for Sheikh Zayed Hospital, Rahim Yar Khan and Dr. Major Amin was approved by the then Chief Minister for Bahawalpur Victoria Hospital, Bahawalpur.

B) PHASE-III

- i) King Edward Medical College, Mayo Hospital, Lady Wellington Hospital and Lady Atchison Hospital, Lahore.
- ii) Nishtar Medical College & Hospital, Multan.
- iii) Services Hospital & Post-graduate Medical Institute (PGMI), Lahore.
- iv) Sir Ganga Ram Hospital & Fatima Jinnah Medical College (FJMC), Lahore.
- v) Children Hospital & Institute, Lahore.
- vi) Allied Hospital & Punjab Medical College (PMC), Faisalabad.

SELECTION OF CHIEF EXECUTIVE FOR PHASE III INSTITUTIONS:

Advertisements were placed in the National and International Press and on the Internet.

Category-Wise list of the applicants for the post of Autonomous Medical Institutions, Chief Executive

Category	Male	Female	Total
Health Department	73	8	81
Private Sector	17	3	20
In Service Army Persons	2	0	2
Retired Army Persons	8	0	8
Other Department	9	0	9
Overseas	1	0	1
Total	110	11	121

- ☐ A selection criterion was developed by the think tank of the Department of Health.
- ☐ A custom-made computer software was developed.
- ☐ Short-listing of the applications was done by analysis with the help of the software and predetermined criteria.
- ☐ The whole process was kept in total confidentiality by the DOH.
- ☐ The first round of interviews was conducted by a committee. The members of the committee included:-
 - i) Health Minister Punjab Chairman
 - Members were:-
 - ii) Chief Secretary, Punjab.
 - iii) Secretary Health, Punjab.
 - iv) Professor Asad Ullah Lone, Member Public Service Commission.
 - v) Mr. Tariq Hameed, Chairman Privatization Board.
 - vi) Mr. Zafar Iqbal Qureshi, Deputy Dean, Lahore University of Management Sciences (LUMS)
 - vii) Professor Amir Aziz, Professor of Orthopaedics, Services Hospital, Lahore.
- ☐ The applications cleared by the committee were then scrutinized by an agency.
- ☐ The then Chief Minister Punjab, then, interviewed the final short-listed applicants and appointed them as CEs.

INDUCTION TRAINING:

Selected Chief Executives underwent 10 days induction training programme. In this programme, Chief Executives were oriented on concept of decentralization and expectations from their role as Chief Executive in managerial and financial skills.

INSTITUTIONAL MANAGEMENT COMMITTEE

A Skeletal IMC was present through Act and by designation, which is given as under:

- a) Chief Executive (Chairman).
- b) Dean/Principal of concerned Medical Institute (Member).
- c) Medical Superintendent of concerned Hospital (Member/Secretary).
- d) Five non-official members proposed by the members listed above and approved by the Government.
- e) As pointed out in the Act, the non-official members were proposed to the government by the Skeletal Committee. The government scrutinized the nominated members and gave its approval. In case of discrepancy the Government would reinstate proposals from the IMC for approval of the nominee.
- f) No direct nominations were made by the Department of Health itself.

BUGS IN THE NEW SYSTEM: AN ANALYSIS:

- A) **Role of Chief Executives Vs Principals:-**
There is a need to clarify the distinct roles of the Chief Executives of the Medical Institutions and the Principals of the allied Medical Colleges. This can be achieved by constructive dialogues, which will help remove the ambiguities.
- B) **PAY OF CHIEF EXECUTIVES:-**
The concept of market driven salary was to attract best professionals available keeping in view the gigantic task of Managing and reforming the complex medical facilities. The Chief executives are to work whole time with full commitment and have been appointed on contract basis. They have no other fringe benefits.
- C) **PROTECTION OF THE POOR:-**
One of the major priorities of Department of health, while granting authority to the institutions was protection of the poor. The advice has been conveyed to the selected Chief Executives at number of occasions, who have been briefed on this issue during the induction-training program. However, this

area needs to be further streamlined so that the poor are not displaced.

D) PUNJAB HOSPITAL AUTONOMY PROJECT (PHAP):-

Side by side the decentralization initiative, Punjab Health Department envisaged project to test the hypothesis of autonomy and develop systems. Protocols, standard operating procedures (SOPs) and mechanisms for the protection of the poor. To launch this pilot project, extensive technical assistance was required coupled with equipment and manpower support.

World Bank appreciated the idea and came forward to finance the project from The Learning innovative Lending (L.I.L) track. This experiment was rated as unique round the world, and World Bank has indicated financial support up to US \$5 million.

E) OBJECTIVES OF PHAP

- i) To test the hypothesis that the granting of greater managerial and financial autonomy would cause the hospitals to improve the quantity and quality of their services, and that this result could be accomplished:-
 - a) With the poor sharing equitably in the benefits of these improvements, and
 - b) Without a large increase in the fiscal burden imposed by the hospitals - i.e. the result would be largely achieved through a combination of better governance, increased efficiency and enhanced resource mobilization.

F) COMPONENTS:-

- i) The pilot project would include 3 large teaching hospitals and one DHQ hospital in Punjab Province in THREE different cities. Each of the hospitals having more than 500 beds and a medical college is attached to three of them.
- ii) Because of the large size of these hospitals and the many services they provide, the pilot would focus on improving certain selected services. If good results are obtained in these selected services, there would be a presumption that hospital autonomy is a promising

strategy which is worth pursuing more broadly. The lessons obtained would be useful for Punjab and also for other provinces.

- iii) The project would adopt a step-wise approach so that correction can be made and lessons learned. It would be completed in three years. The emergency services department appears suitable as the early focus of the pilot, because it has a somewhat larger degree of operational independence as compared to inpatient areas and outpatient departments and is highly visible service where positive results can be demonstrated in a short time-frame (it also provides more equitable service, where patients are admitted as they show up at the facility regardless of socioeconomic status). Success in the early part of the pilot would provide encouragement and political support for the reforms.
- iv) Thereafter the focus would be on improving two categories of non-emergency services (e.g. pediatrics, and obstetrics and Gynecology). Mechanisms to protect the poor would also be introduced.
- v) It should be noted that improving selected services as described would require changes not only in aspects of the hospitals operations directly related to the services in question, but also in some of the major operational system of the hospitals e.g. information systems, accounting systems (introducing cost accounting), Personnel management system, and so forth.
- vi) The project would incorporate a Monitoring and Evaluation component. A set of performance indicators would be defined and monitored. Some of these indicators would relate to quality of service aspects; other indicators would relate to efficiency aspect, still other would relate to equity aspects.

G) UPDATE OF THE PROJECT

- i) After initial formulation the concept of the project has been approved by the Punjab Planning and Development

Department, the Federal Planning Commission and ECNIC.

- ii) World Bank, finally, appraised the project through its appraisal mission which visited Pakistan from 4-12 October, 1999.
- iii) PCI of the project is currently under preparation.
- iv) Project would be effective from January 2000.

II) OUTCOMES AND BENEFITS

Systems developed, as part of the project would be replicated to all other Autonomous Institutions with little or no extra cost.

LAST WORD:

In the present study, various aspects and phases of the mechanism of this new managerial Arrangement have been discussed, in length, in order to make an assessment of the whole phenomena. The process of recruitment, the criteria for selection of Chief Executives, and roles of different committees, and the Bugs in the system, have, also, been subjected to analysis. Likewise, THE PRE-AUTONOMY AND POST-AUTONOMY SITUATIONS AND POSITIONS have been crafted, too. In the last, it has been observed that the New System of Health Management and its enforcement as a Service-Oriented and Target-based Health care set-up, has

been found working satisfactorily and producing the desired goals; this is the reason that it has been acknowledged and appreciated by the World Bank, too.

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From EDITOR

UNIFORM REQUIREMENTS FOR MANUSCRIPTS SUBMITTED TO BIOMEDICAL JOURNALS

In the 18 years since it was first published, the "uniform requirements for Manuscripts submitted to Biomedical Journals" (the Vancouver style), developed by the International Committee of Medical Journal Editors (ICMJE), has been widely accepted by both authors and editors; over 400 journals have stated that they will consider manuscripts that conform to its requirements. This is the fourth edition of the Uniform Requirements, the first to be published in the Journal, which now serves as coordinator of the ICMJE in North America.

International Committee of Medical Journal Editors, Members of the committee are Suzanne and Robert Fletcher (Annals of Internal Medicine), Laurel Thomas (Medical Journal of Australia), Stephen Lock (British Medical Journal), George D. Lundberg (Journal of the American Medical Association), Robin Fox (Lancet), Magne Nylenna (Tidsskrift for den Norske Lægeforening), Lois Ann Colaizzi (Index Medicus), Arnold S. Relman and Marcia Angel (New England Journal of Medicine), Povl Riis (Journal of the Danish Medical Association, Danish Medical Bulletin), Richard G. Robinson (New Zealand Medical Journal), Bruce P. Squires (Canadian Medical Association Journal), and Linda Clever (Western Journal of Medicine), Address correspondence to Editor, the New England Journal of Medicine, or Editor, British Medical Journal.

In January 1978 a group of editors from some major biomedical journals published in English met in Vancouver, British Columbia, and decided on uniform technical requirements for manuscripts to be submitted to their journals. These requirements, including formats for bibliographic references developed for the Vancouver group by the National Library of Medicine, were published in three of the journals early in 1979. The Vancouver group evolved into the International Committee of Medical Journal Editors. Over the years, the group has revised the requirements slightly; this is the fourth edition.

Over 400 journals have agreed to receive manuscripts prepared in accordance with the requirements. It is important to emphasize what these requirements imply and what they do not.

First, the requirements are instructions to authors on how to prepare manuscripts, not to editors on publication style. (But many journals have drawn on these requirements for elements of their publication styles.)

Second, if authors prepare their manuscripts in the style specified in these requirements, editors of the participating journals will not return manuscripts for changes in these details of style. Even so, manuscripts may be altered by journals to conform with details of their own publication styles.

Third, authors sending manuscripts to a participating journal should not try to prepare them in accordance with the publication style of that journal but should follow the "Uniform Requirements for Manuscripts Submitted to Biomedical Journals."

Nevertheless, authors must also follow the instructions to authors in the journal as to what topics are suitable for that journal and the types of papers that may be submitted (or example, original articles, reviews, or case reports. In addition, the journal's instructions are likely to contain other requirements unique to that journal, such as number of copies of manuscripts, acceptable languages, length of articles and approved abbreviations.

Participating journals are expected to state in their instructions to authors that their requirements are in accordance with the "Uniform Requirements for Manuscripts Submitted to Biomedical Journals" and to cite a 'Published version'.

This documents will be revised at intervals, inquiries and comments from Central and North America about these requirements should be sent to: Editor, the *New England Journal of Medicine*, 10 Shattuck St., Boston; MA 02115; those from other regions should be sent to Editor, *British Medical Journal*, British Medical Association, Tavistock Sq., London WC1H 9JR, United Kingdom. Note that these two journals provide secretariat services for the International Committee of Medical Journal Editors; they do not handle manuscripts intended for other journals. Papers intended for other journals should be sent directly to the offices of those journals.

Summary of Requirements

Type the manuscript double-spaced, including title page, abstract, text, acknowledgments, references, tables and legends.

Each manuscript component should begin on a new page, in the following sequence; title page; abstract and key words; text; acknowledgments; references; tables (each table complete with title and footnotes on a separate page); and legends for illustrations.

Illustrations must be good-quality, unmounted glossy prints, usually 127 x 173 mm (5 x 7 inches), but no larger than 203 x 254 mm (8 x 10 inches).

Submit the required number of copies of manuscript and figures (see journal's instruction) in a heavy paper envelope. The submitted manuscript should be accompanied by a covering letter, as described under Submission of Manuscripts and permissions to reproduce previously published material or to use illustrations that may identify human subject. Follow the journal's instructions for transfer of copyright. Authors should keep copies of everything submitted.

Prior and Duplicate Publication

Most journals do not wish to consider for publication a paper on work that has already been reported in a published paper or is described in a paper submitted or accepted for publication elsewhere. This policy does not usually preclude consideration of a paper that has been rejected by another journal or of a complete report that follows publication of a preliminary report, usually in the form of an abstract. Nor does it prevent consideration of a paper that has been presented at a scientific meeting if not published in full in a proceedings or similar publication. Press reports of the meeting will not usually be considered as breaches of this rule, but such reports should not be amplified by additional data or copies of tables and illustrations. When submitting a paper an author should always make a full statement to the editor about all submissions and previous reports that might be regarded as prior or duplicate publication of the same or very similar work. Copies of such material should be included with the submitted paper to help the editor decide how to deal with the matter.

Multiple publication that is, the publication more than once of the same study, irrespective of whether the wording is the same is rarely justified. Secondary publication in another language is one possible justification, provided the following conditions are met.

1. The editors of both journals concerned are full informed; the editor concerned with secondary publication should have a photocopy, reprint, or manuscript of the primary version.
2. The priority of the primary publication is respected by a publication interval of at least two weeks.
3. The paper for secondary publication is written for a different group of readers and is not simply a translated version of the primary paper; and abbreviated version will be sufficient.
4. The secondary version reflects faithfully the data and interpretations of the primary version.

5. A footnote on the title page of the secondary version informs readers years and documenting agencies that the paper was edited and is being published, for a national audience in parallel with a primary version based on the same data and interpretation. A suitable footnote might read as follows: this article is based on a study first reported in the [title of journal, with full reference].

Multiple publication other than as defined above is not acceptable to editors. If authors violate this rule they may expect appropriate editorial action to be taken.

Preliminary release, usually to public media, of scientific information described in a paper that has been accepted but not yet published is violation of the policies of many journals. In a few cases and, only by arrangement with the editor, preliminary release of data may be acceptable for example, to warn the public of health hazards.

Preparation of Manuscript

Type the manuscript on white bond paper, 216 x 279 mm (8½ x 11 inch.) or ISO A4 (212 x 297 mm), with margins of at least 25 mm (1 inch). Type only on one side of the paper. Use double spacing throughout including title page, abstract, text acknowledgment references, tables and legends for illustrations. Begin each of the following sections of separate pages: title page, abstract and key words, text, acknowledgments, references, individual tables and legends. Number pages conclusively, beginning with the title page. Type the page number in the upper or lower right hand corner of each page.

Title Page

The title page should carry (a) the title of the article, which should be concise but informative; (b) first name, middle initial and last name of each author, with highest academic degree(s) and institutional affiliation; (c) name of department(s) and institution(s) to which the work should be attributed; (d) disclaimers if any; (e) name and address of author responsible for correspondence about the manuscript; (f) name and address of author to whom requests for reprints should be addressed or statement that

reprints will not be available from the author; (g) source(s) of support in the form of grants, equipment, drugs, or all of these; and (h) a short running head or foot line of no more than 40 characters (count letters and spaces) placed at the foot of the title page and identified.

Authorship

All persons designated as authors should qualify for authorship. The order of authorship should be a joint decision of the co-authors. Each author should have participated sufficiently in the work to take public responsibility for the content.

Authorship credit should be based only on substantial contributions to (a) conception and design, or analysis and interpretation of data; and to (b) drafting the article or revising it critically for important intellectual content; and (c) on final approval of the version to be published. Conditions (a), (b), and (c) must all be met. Participation solely in the acquisition of funding or the collection of data does not justify authorship. General supervision of the research group is also not sufficient for authorship. Any part of an article critical to its main conclusions must be the responsibility of at least one author.

A paper with corporate (collective) authorship must specify the key persons responsible for the article; other contributing to the work should be recognized separately (see Acknowledgments).

Editors may require authors to justify the assignment of authorship.

Abstract and Key Words

The second page should carry an abstract (of no more than 150 words for unstructured abstracts or 250 words for structured abstracts). The abstract should state the purposes of the study or the investigations, basic procedures (selection of study subjects or laboratory animals; observational and analytical methods) main findings (give specific data and their statistical significance, if possible and the principal conclusions. Emphasize new and important aspects of the study of observation.

Below the abstract, provide and identify as such, 3 to 10 key words or short phrases that will assist indexers in cross indexing the article and may be published with the abstract. Use terms from the medical subject headings (MESH) list of *Index Medicus*; if suitable MESH term are not yet available for recently introduced terms, present terms may be used.

Text

The text of observational and experimental articles is usually but not necessarily divided into sections with the headings Introduction, Methods, Results, and Discussion. Long articles may need subheadings within some sections to clarify their content, especially the Results and Discussion sections. Other types of articles such as case reports, reviews, and editorials are likely to need other formats. Authors should consult individual journals for further guidance.

Introduction

State the purpose of the article. Summarize the rationale for the study or observation. Give only strictly pertinent references and do not review the subject extensively. Do not include data or conclusions from the work being reported.

Methods

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Acknowledgments

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You CH. lee KY, Chey RY, Menguy R. Electrogastrographic study of patients with unexplained nausea, bloating and vomiting. *Gastroenterology* 1980 Aug; 79(2):311-4.

As an option, if a journal carries continuous pagination through out a volume, the month and issue number may be omitted. You CH, Lee KY, Chey RY, Menguy R. Electrogastrographic study of patients with unexplained nausea, bloating and vomiting. *Gastroenterology* 1980; 79:311-4

Goate AM, Haynes AR, Owen MJ, Farrall M, James LA, Lai LY, *et al.* Predisposing locus for Alzheimer's disease on chromosome 21. *Lancet* 1989; 1:352-5.

2. *Organization as author*

The Royal Marsdon Hospital Bone Marrow Transplantation Team. Failure of syngeneic bone marrow graft without preconditioning in post-hepatitis marrow aplasia. *Lancet* 1977; 2:724-4

3. *No author given*

Coffee drinking and cancer of the pancreas [editorial] *BMJ* 1981;283:628.

4. *Article in a foreign language*

Massone L, Borghi S, Pesarino A, Piccini R, Gambini C. Localisations palmaires purpuriques de la dermatite herpétiforme. *Ann Dermatite venereol* 1987; 114:1545-7

5. *Volume with supplement*

Magni F, Rossoni G, Berti F. BN-52021 protects guinea-pig from heart anaphylaxis. *Pharmacol Res Common* 1988; 20 Suppl 5:75-8

6. *Issue with supplement*

Gardos G, Cole JO, Haskell D, Marby D, Paine SS, Moore PP. The natural history of tardive dyskinesia. *J Clin Psychopharmacol* 1988; 8(4 Suppl): 315-375.

7. *Volume with part*

Hanly C. Metaphysics and innateness: a psychoanalytic perspective. *Int Psychoanal* 1988; 69(Pt3): 389-99

8. *Issue with part*

Edwards L, Meyskens F, Levine N. Effect of oral isotretinoin on dysplastic nevi. *J Am Acad Dermatol* 1989; 20(2 pt 1): 257-60.

9. *Issue with no volume*

Baumeister AA. Origins and control of stereotyped movements. *Monogr Am Assoc Ment Defic* 1978; (3):353-84.

10. *No issue or volume*

Danoek K. Skiing in and through the history of medicine. *Nord Medicinhist Arsb* 1982;86: 100.

11. *Pagination in Roman numerals*

Ronne Y. Ansvarsfall. Blodtransfusion till fel patient. *Vardfacket* 1989; 13: XXVI-XXVII.

12. *Type of article indicated as needed*

Spargo PM, Manner JM. DDAVP and open heart surgery [letter]. *Anaesthesia* 1989; 44:363.

4. Fuhman SA, Joiner KA. Binding of the third component of complement C3 by *Toxoplasma gondii* [abstract]. *Clin Res* 1987; 35: 475A.

13. *Article containing retraction*

Shishido A. Retraction notice: Effect of platinum compounds on murine lymphocyte mitogenesis (retraction of Alsabti EA, Ghalib ON, Salem MH. In: *jpn J Med Sci Biol* 1979; 32:53-65). *Jpn J Med Sci Biol* 1980; 33:235-7.

14. *Article retracted*

Alsabti EA, Ghalib ON, Salem MH. Effect of platinum compounds on murine lymphocyte mitogenesis [Retracted by Shishido A. In: *Jpn J Med Sci Biol* 1980; 33:235-7]. *Jpn J Med Sci Biol* 1979; 32:53-65.

15. *Article containing comment*

Piccoli A, Bossatti A. Early steroid therapy in IgA neuropathy: still an open question [comment]. *Nephron* 1989; 51:289-91. Comment on: *Nephron* 1988; 48:12-7.

16. *Article commented on*

Kobayshi Y, Fujii K, Hiki Y, Tateno S, Kurokawa A, Kamiyama M. Steroid therapy in IgA nephropathy: a retrospective study in heavy proteinuric cases (see comments). *Nephron* 1988; 48:12-7. Comment in: *Nephron* 1989; 51:28991.

17. *Article with published erratum*

Schofield A. The CAGE questionnaire and psychological health [published erratum appears in *Br J Addict* 1989; 84:701J *Br J Addict* 1988; 83:761-4

Books and Other Monographs

18. *Personal author(s)*

Colson JH, Armour WJ. Sports injuries and

their treatment. 2nd rev. ed. London: S. Paul, 1986.

19. *Editor(s), compiler as author*

Diener HC, Wilkinson Me, editors. Drug induced headache. New York: Springer-Verlag, 1988.

20. *Organization as author and publisher*

Virginia Law Foundation. The medical and legal implications of AIDS Charlottesville: The Foundation, 1987.

21. *Chapters in a book*

Weinstein L, Swartz MN. Pathologic properties of invading microorganisms. In: Sodeman WA Jr, Sodeman WA, editors. Pathologic physiology: mechanisms of disease. Philadelphia: Saunders, 1974:457-72.

22. *Conference proceedings*

Vivian VL, editor. Child abuse and neglect: a medical community response. Proceedings of the First AMA National Conference on Child Abuse and Neglect; 1984 Mar 30-31; Chicago. Chicago: American Medical Association, 1985.

23. *Conference paper*

Harley NH. Comparing radon daughter dosimetric and risk models. In: Gammage RB, Kaye SV, editors. Indoor air and human health. Proceedings of the Seventh Life Sciences Symposium; 1984 Oct 29-31; Knoxville (TN). Chelsea (MI): Lewis, 1985:69-78.

24. *Scientific and technical report*

Akutsu T. Total heart replacement device. Bethesda (MD): National Institutes of Health, National Heart and Lung Institute: 1974 Arp. Report No: HHH-NHLI 69 2185-4.

25. *Dissertation*

Yousef NM. School adjustment of children with congenital heart disease [dissertation]. Pittsburgh (PA): Univ of Pittsburgh: 1988.

26. *Patent*

Harred JF, Knight AR, McIntyre JS, inventors. Dow Chemical Company, assignee. Epoxidation Process. US patent 3,654,317. 1972 Apr 4.

Other Published Material

27. *Newspaper article*

Rensberger B. Specter B. CFCs may be destroyed by natural process. The Washington Post 1989 Aug 7: Sect. A:2(Col. 5)

28. *Audiovisual*

AIDS epidemic: the physician's role [video recording]. Cleveland (OH): Academy of Medicine of Cleveland, 1987.

29. *Computer file*

Renal system [computer programme]: MS-DOS version. Edwardsville (KS): Medi Sim. 1988.

30. *Legal material*

Toxic Substances Control: Hearing on S. 776. Before the Subcomm on the Environment of the Senate Comm. On Commerce, 9th Cong. 1st Sess, 343 (1975).

31. *Map*

Scotland [topographic map]. Washington: National Geographic Society (US). 1981

32. *Book of the Bible*

Ruth 3:1-18. The Holy Bible. Authorized King James version. New York: Oxford Univ. Press, 1972

33. *Dictionary and similar references*

Ectasia. Dorland's illustrated medical dictionary. 27th ed. Philadelphia: Saunders, 1988:527.

34. *Classical material*

The Winter's Tale: act 5, scene I, line 13-16. The complete works of William Shakespeare. London: Rex; 1973.

Unpublished Material

35. *In press*

Lilly White HB, Donald JA. Pulmonary blood flow regulation in an aquatic snake. Science. In press.

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International Committee of Medical Journal Editors. Uniform requirements for manuscripts submitted to biomedical journals. *N Engl J Med* 1991; 324: 424-8.

International Committee of Medical Journal Editors. Uniform requirements for manuscripts submitted to biomedical journals. *BMJ* 1991; 302(6772).

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