PN-AAT-876

AGRICULTURAL MARKETING AND PRICE POLICY

IN

RAPTI ZONE AND RCUP AREAS

FINAL REPORT

Submitted to : The United States Agency For International Development (USAID) Kathmandu, Nepal.

Submitted by : Integrated Development Systems (IDS)
Baneswor, Kathmandu
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PREFACE

IDS has undertaken this study under a contract with USAID/ Nepal, in conjunction with USAID's involvement in the Rapti Agricultural Development Project and the Resource Conservation and Utilization Project in Nepal.

These two projects cover either the whole of or a substantial part of five hill districts, one inner-terai and one mountain district in western and far western Nepal. Transportation and marketing channels are poorly developed in all of these areas. The relevant concern is whether these projects may fail to achieve their desired goal of increasing agricultural production and rural incomes without improved marketing networks and suppertive price and marketing policies.

In the context of subsistence-oriented small-holder agriculture in as diverse an area as the eight districts covered in the Rapti and RCU project, many important and complex issues must be addressed in order to gain a proper understanding of the marketing network-price formation-production response relationship. Full attention cannot be given to all these concerns. This study has a very specific narrow focus, which is to explain whether and how existing differences in market access and price formation behaviour among different sample points in the Rapti and RCU district lead to significant differences in household production and income.

General conclusions about the role and recommendations concerning marketing and price policy interventions emerge from the study. But it should be clarified that this study does not put together a detailed design of the specific marketing and price policy options most appropriate for Rapti and RCU.

This study has been organized and prepared by a team of IDS economists, Mr. Prem J. Thapa (Project Coordinator) and Mr. Dilli P. Sitaula and Mr. Bala B. Bhandari. Many other individuals have assisted this team at various stages in what has proven to be a very lengthy study period. IDS acknowledges the contributions of Mr. Govinda Koirala, Mr. Bhola Pokhrel and Dr. Bheka L. Maharjan in the design and early stages of the study. Mr. Dilli P. Sitaula of IDS, Mr. Raghu Shrestha and Mr. Madhav Khoju shared the supervisory responsibilities during the extensive survey schedule of 55 sample locations in eight districts, often under very difficult conditions. The list of survey enumerators is too long to be acknowledged here, but their effort in the field, and later in the coding of the survey data, was very conscientious and efficient.

IDS and the study team are very grateful for the suggestions made and the cooperation extended by the USAID/Nepal personnel involved with this study at one time or another: Dr. David Mutchler, Mr. William Douglas, Mr. William Nance and Mr. Paul Moriss.

A draft report on this study was submitted to USAID/Nepal in June 1984. This final report has benefitted from the comments and suggestions made by USAID on the earlier draft; and also those made by the Ms. Nancy Axinn, along with her editorial assistance.

Finally, IDS gratefully acknowledges the co-operation and friendship extended by many persons in the RCU and RAD program offices, in Kathmandu and in the field; along with the help and hospitality received from all the concerned officials, well-wishers and survey respondents during the course of the survey schedule.

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CHAPTER - I

INTRODUCTION

A. THE CONTEXT OF AGRICULTURAL MARKETING

(i) The analytical Framework

1.1 The subject matter of agricultural marketing and the analytical issues it raises are vast and complex. Marketing is often given a separate identity but it is logically an integrated component of the analysis of farm management and production. That production and markets are mutually dependent is a well-established relationship. The price of farm output and input purchases is the primary factor connecting the producer to the marketing system; so price policy has an instrumental link with the research issues and policies of agricultural marketing.

1.2 Prices, however, represent what is only the tip of the iceberg. Agricultural marketing, directly or through the intermediary of prices, determines not only production (supply) response and adoption of new inputs and technology, but also a very wide range of other critical concerns. It affects levels of real income and consumption within both the agricultural and non-agricultural sector, and income distribution within the former; the terms of trade between agriculture and non-agriculture and the level of inter-sectoral resource flows; international trade and balance of payments position (if farm output and inputs have a high traded content); as well as the aggregate growth of an agrarian economy.

1.3 While the broad role and overall effects of agricultural marketing policies are recognized, one can hardly do justice to any one specific issue without restricting the analytical

focus. With a narrower interpretation, most studies of agricultural marketing focus on the limited set of activities and agents involved in moving and transforming farm produced goods and raw materials to their final consumers. The marketing system purchases, stores, processes, transports, and finally re-sells farm output and farm inputs. Economic transactions are involved at each-step in the process; and this chain is interpreted as a distinct productive activity. The output of this production is "marketing services" and its "price" is the marketing margin between producer and consumer prices, allocated to each distinct step in the chain.

1.4 That the entired marketing chain is interpreted as the production (and consumption) of specific marketing services which add time, place, and form utility to farm products and intermediate goods represents the dominant perspective in the recent literature on agricultural marketing.[1/] These functions are therefore explained in terms of the standard economic theories of price determination and of the behaviour of individual firms applied to the "marketing" market or industry. Consequently, the bulk of the literature on agricultural marketing focuses on the issues which are relevant in the analysis of production of any arbitrary commodity. The major themes are: the structure and competitiveness of the "marketing" market organization; price (marketing margin) and output (market deliveries) determination; the efficiency with which it signals resource alloca-

1/ Watson (1982) discusses the evolution and advantages of this perspective of agricultural marketing. The contrast is made with the more conventional descriptive view of what happens in the marketing chain, and the more specialised perspective of "business marketing" drawn from the industrial sector.

tion (usually studied as the degree of market integration or the uniform movement of spatial prices); and alternative market structures (co-operatives, monopoly-boards or regulated markets).[2/]

1.5 Such an interpretation of the marketing function represents a fruitful approach to the analysis of agricultural marketing since it emphasizes its co-ordinating and organizational role in an activity (agricultural production) which is by its nature physically as well as sectorally disaggregated in most economies. But direct applications and the usefulness of this approach will depend on the extent to which specialized marketing institutions and agents are developed, and also on the general level of economic development of a particular country or region. In the setting of traditional agriculture, the "marketing services" approach is unnecessarily restrictive because it completely isolates the analysis of agricultural marketing from the effect it has on agricultural production. In contrast to the conditions prevailing in developed or commercialized agriculture, the relationship between farm production and the marketing system needs to be explored directly when increasing agricultural production is a primary objective. It is perceived that inducing traditional farmers to produce for a market and to allocate resources according to market signals is a critical part of the transformation of traditional agriculture.

2/ Bateman (1976) provides a detailed survey of the research on these issues. A review of the applications of agricultural marketing research in India (but only up to the early 1970's) is provided by Shah (1975).

1.6 The marketing systems of developed commercialized agriculture and that of traditional agriculture in the developing countries are to be distinguished for other reasons also. In the former context, where generally competitive conditions prevail, the law of one price tends to equalize all spatial and form price differentials of agricultural products to the costs incurred in providing a particular service, be it in transportation or processing. The relevant research issue is to analyze how these markets adjust continuously to new information covering costs and demands for the various services provided (Watson, 1982).

1.7 In traditional agriculture, numerous imperfections in the product markets, the lack of transportation and storage facilities, and inadequate market intelligence systems seriously curtail the competitiveness and efficiency of the marketing system. Part of the research interest seeks to document to what extent specific marketing systems diverge from the competitive ideal. A lively debate has been going on this issue, with substantial empirical evidence cited from India and Africa. This debate gives valuable insights on how rural markets are organized and how they function. From a Nepalese perspective, the large volume of data and discussion relating to the marketing system in India is very useful since these structures and channels can be taken to be approximately similar in Nepal's terai.

1.8 The debate on the extent of the competitiveness and efficiency of marketing structures observed in traditional agriculture does not lead to any conclusive final verdict. The discussions have shown that traditional marketing

channels and trading agents are firmly rooted in the agrarian structure of even small-scale producers; and that traditional agriculture has a very active and successful marketing network. But the claim that these services are provided in an efficient and competitive environment cannot be made as a general result.[3/]

1.9 From a theoretical perspective, efficiency and competition in traditional marketing systems are issues of interest by themselves. But certainly a major underlying purpose to such discussions is to pinpoint how aspects of the traditional marketing system affect producer incentives and the volume of production and marketed surplus. Most of the empirical studies have not explicitly studied this link between the marketing system (and its deficiencies) and farm-level production.

1.10 The marketing-production response assumes greater importance in the context of large scale agricultural investments under the rubric of integrated rural development programmes. Inadequate transportation and marketing facilities in connection with unremunerative and unpredictable prices can be a major bottleneck in realizing the benefits of agricultural investments in traditional farming communities. A marketing component is increasingly perceived as a

3/ In the Indian debate, several noted authors have led the attack on the prevailing view that marketing structures in traditional agriculture (especially for food) are monopolistic, inefficient, fragmented and exploitative. They claim that trading profits are not excessive, price discrimination does not occur, and that markets are competitive as well as integrated. This debate as well as the criticisms of the arguments used to demonstrate efficiency and competitiveness is summarized by Ashok Rudra (1982).

necessary part of the package of rural development investments (Lele, 1975). The marketing component is even more critical when the expected production increases begin to materialize. A large increase in production within a very short term period - say, following rapid adoption of HYV varieties and new technology - can depress prices to the extent that farm profits are reduced, unless additional markets are developed. Such a link between marketing and farm level production and the related issue of access and use of modern inputs and technology appears as the most critical concern in agricultural marketing in Nepalese agriculture.

(ii) Agricultural Marketing Issues in Nepal

1.11 The literature on agricultural marketing issues in Nepal is still scanty, but it has been growing rapidly. Many of the studies are primarily descriptive, detailing the marketing channels, and the volume and type of transaction within specific market areas, including hat bazaars (periodic temporary rural markets). Most of these are prepared by the Food and Agricultural Marketing Services Division (FAMSD) of the Ministry of Agriculture. More substantive analyses of marketing issues are reported in a series of studies undertaken by and through AFROSC. A very detailed and exhaustive review of foodgrain marketing and price policy at a national level has also been recently completed (AFROSC, 1982a). A common limitation of these studies is that they focus only on the marketing services activities - purchasing, storing, handling, processing, etc. - without explicitly considering the link between marketing issues and farm level production. Even when

primary farm level data has been collected through a survey, this link between farm production and various measures of market efficiency or market participation is not usually studied.

1.12 Available studies have established some basic facts related to agricultural prices and marketing policies in Nepal. Seasonal variation of agricultural prices is very clearly documented. Annual price variations in the range of 20% to 60% are recorded at the level of specific district markets (e.g. Kanchanpur in FAMSD, 1976); a large urban market such as Pokhara (APROSC, 1982b); rural hat bazaars (e.g. Ilam in Shrestha and Sharma, 1980); and the major terai market centers (APROSC, 1981).

1.13 The last study also finds that while food grain prices among terai markets are fairly uniform - indicating a unexpected degree of market integration - this is not so for the hill markets. Another APROSC study (1982a) has documented the high correlation between prices in the major urban centers of Nepal's terai and prices in India. But in both of these studies the analysis is done at the level of retail prices. The spatial distribution of producer prices (actual prices received by farmers) can be very different from retail prices because marketing margins (the share of traders and other intermediaries) need not be uniform. The grain trade in Nepal is controlled by oligopolistic elements, primarily large mill owners.[4/] Consequently producer prices are [illegible]

4/ The study by APROSC (1982a) provides an exhaustive and exemplary coverage of marketing channels and margins. This information is generated from a survey of primary as well as secondary markets in both the hill and terai regions of the country. Our discussion borrows heavily from this study since it provides most of the basic information. Other studies are cited where relevant for additional information.

likely to be well correlated with final retail prices in the different market centers.

1.14 The basic structure of marketing institutions and the channels through which agricultural products are moved in Nepal are now adequately documented. Some preliminary data on the relevant margins are also available. There are important differences between different crops and between the hill and terai districts. Paddy marketing in the terai has the most extensive network while that for a cash crop like jute is more vertically integrated (IDS, 1980). The hill-terai marketing link is usually restricted to adjacent districts only. Wholesale supply channels to the hills are limited. Most of the grain moves to the hills through retailers who bear their own (high) transportation costs.

1.15 Private traders and transactions predominate in agricultural marketing of food grain in Nepal. The major public sector influence occurs in the form of grain purchases and subsidized distribution in different areas by the Nepal Food Corporation (NFC). The practices and effect of the NFC has also been studied in detail (Mudhbary, 1981). NFC purchases are mainly from millowners and wholesalers in the terai. The impact on primary farm markets is thought to be minimal. On the other hand, the amount of the subsidized grain distributed by the NFC in the different hill districts is a very small fraction of the total food requirement of these districts. An empirical assessment of whether NFC distribution adversely affects prices and producer's incentives in the deficit regions has not yet been made. But a

strong adverse effect appears unlikely because of the small volume of grain distributed and the fact that most food deficit areas may not even produce a seasonal surplus.[5/]

1.16 From the perspective of price policy, the relationship between market development and higher producer prices (which in turn generates increased production) is also not clearly established in Nepal. The evidence for a pure supply response to higher prices itself is very limited.[6/] But on this issue, one can freely borrow the large evidence from India and the other countries that output and marketable surplus elasticities are positive and high even for subsistence crops.[7/]

1.17 The important aspects left out of such supply or marketable surplus response studies are (a) how well producer prices

5/ The effect of subsidized food distribution policies on local producers' incentives must be analyzed in terms of the seasonal volume of production (i.e. not trading surplus or deficit) rather than an absolute category derived by deducting estimated consumption from total local production. Many hill districts in Nepal can be surplus from a trading perspective, as exemplified by Muwakot (Johl, 1981)

6/ Aggregate supply response of crop acreage (a Nerlovian adjustment model) is reported in APROSC (1981) on the basis of national time series data for major crops. The reported short run elasticities are in the range of 0.01 to 0.4 with some surprisingly being negative. Since time series data on producer prices in Nepal is not available, the study has used national retail food prices (from the consumer price index computations of the Rastra Bank). Large errors are possible because producer prices may not move sympathetically with retail prices; and also because the national market is not integrated.

7/ cf. Yotopolous and Nugent (1979); Chapter 8, and the references cited therein.

and final retail prices are integrated such that price increase at the retail level and in the marketing chain are passed on to producers; and (b) the effect of higher market prices on the subset of farm households who are food-deficit and/or have little seasonal surpluses to sell. These points must be carefully analyzed before any broad policy conclusion can be drawn about the benefits of expected production increases through price policy intervention in agricultural marketing.

1.18 The producer's share of final consumer prices for the main food crops in the major terai markets is estimated to be in the range of 72% to 85% (APROSC, 1982a; Annex 7). It is difficult to make any definite claims about the extent of trading monopoly or efficiency from such data. A more meaningful measure would be to estimate how this share changes in response to supply conditions over time. Are the benefits of higher retail prices (say, in a bad harvest year) appropriated primarily by the middlemen, or are they passed on, on a proportional basis, to the producer? No evidence on this issue has been put forward yet.[8/]

1.19 The second point also needs careful study. A distinction must be made between the supply response of subsistence crops and the supply response of subsistence farmers. Higher prices are likely to expand production and marketable surplus, but

8/ In reviewing the history of agricultural price policy in India, Mahlon and Tyagi (1983) argue that the market structure often has not succeeded in channelling the effects of public price policy intervention to the actual producers. It would be fair to assume that a similar situation occurs in Nepal.

this response may not come uniformly from all groups of producers. What are the perceived benefits of higher prices when most households are not net surplus producers of food but net purchasers? When the relative price of one or two crops increase, there may be enough flexibility in production plans to alter crop acreage and even consumption patterns. But when there is a general rise in all agricultural prices (affecting all sales and purchases), even this limited flexibility may not materialize.

1.20 A high degree of subsistence orientation (family self-sufficiency in both consumption and use of farming inputs) is a distinctive feature of Nepalese agriculture, even within the terai. Detailed estimates on the proportion of farm households who are net sellers of food grains (and those who sell off seasonal surpluses but are actually net purchasers) are not available, but one expects these numbers to be very small.[9/] This is one of the features on which Nepalese agriculture varies from Indian agriculture. The market participation of small scale farmers in India is well documented, and they contribute a substantial portion of the marketable surplus.[10/]

9/ We were not able to find any national or regional estimates of the proportion of households with net farm sales. From a slightly different perspective, a large scale survey of the Mid-western Development Region of Nepal found that 46% of households report gross farm sales of less than Rs.250. This sample combined hill and terai households. cf. Blaike et. al (1976).

10/ D. Harris (1982) in a study from South India, reports that significant market participation is observed in all size-class of farmers. Small farmers cultivating an average of 4.5 acres account for 27% of the marketable surplus in her study. Of course, small farmers in the Indian context are not small farmers in Nepal (4.5 acres = 35 ropani). But one can generally state that the degree of subsistence is higher in Nepalese agricultural even for equivalent size classes.

(iii) The Approach of the Study

1.21 The points raised above indicate the necessity of studying the effect of market access on production directly in the Nepalese context. The price variable alone may not be the critical factor because, firstly, local producer prices need not be correlated with consumer prices and the location of main market centers. Secondly, prices may not be a very important determinant of the level of household production for most households because of the primacy of fulfilling family subsistence needs.

1.22 When transportation and other infrastructural facilities related to agriculture marketing are minimally developed, market access characteristics as well as marketing channels will vary greatly by location. This is the natural consequence of fragmented markets. It is possible under such conditions to evaluate and empirically estimate the direct consequence of differential market access characteristics on farm household production and income. This is the approach taken in the present study.

1.23 It is not enough, however, to merely document that favourable market access characteristics increase household production and income within a sample of households selected for study. Market access and other location-specific factors will affect farm production and income through certain intermediary variables. There is considerable theoretical interest as well as differing policy implications about which of these intermediary variables have the most direct and significant effect. These principal market access related variables and the manner through which they affect farm household and income can be classified as follows:

a. Price Effect

(i) higher and more stable producer prices for farm output.

(ii) lower prices and timely access to purchased inputs, e.g., fertilizers, HYV seeds etc. Qualitative differences in these inputs may also occur.

b. Effective Demand Effect

(i) increased specialization: market access can boost production by fostering division of labour and specialization in a few most profitable economic activities within a farm household. Such a reorganization of resource allocation may be otherwise limited by an effective demand constraint. Benefits of economies of scale in certain activities may also occur.

(ii) vent for surplus:[11/] production may be increased without the benefit of specialization or higher prices if household resources can be utilized more intensively, which otherwise are lying idle. Market access can lead to a greater intensity of land cultivation even with traditional methods; or adoption of new inputs and technologies that boost land productivity.

c. Market Intelligence and Management Efficiency

Households who produce mainly for the market will be more attuned to market conditions, and can use this information to adjust production plans accordingly for a more efficient resource allocation. Qualitative differences in the "management" input of the farm operatory may also boost production.

11/ The term is borrowed from the international trade literature where it is used analogously to explain export-led growth in production of a specific commodity. The vent for surplus model is most applicable in countries with a rich natural resource base which is untapped as long as international trade links are not established. A similar constraint may operate in inter-regional trade. cf. H. Myint, The Economics of the Developing Countries, London, 1964).

d. Other Income Opportunities

Prospects for seasonal as well as full-time earnings (given the expected under-employment in agriculture) from sources other than own-farm cultivation is usually related to market access and participation. This might be an important effect of market access in Nepal because rural non-agricultural employment is very limited and location specific.

In addition to measuring the contribution of market access to household production and income, this study seeks to highlight the medium or the channels through which this relationship is established along the lines indicated above.

(iv) Organization of the Study Report

1.24 The remaining section of this introductory chapter (Part B) provides a general overview of the reference areas for this study - namely, Rapti Zone and the sections of the three districts that form the RCUP area. The existing pattern of market access and the organization of agricultural marketing in the study areas are also briefly detailed in this section of the report. The methodology of the study and the resulting sample design are discussed in Chapter II. Issues and problems concerned with the differentiation of market access and the measurement of household production and income from survey data are also noted in Chapter II.

1.25 Chapter III reviews the socio-economic as well as market access related characteristics of the sample households. This provides a check on the representativeness of the sample drawn for this study in comparision with the Baseline data. Secondly, the observed differences in market access related characteristics provide an indirect verification of the appropriateness of the sampling design used in

the study. Chapter III also previews the analysis of the effect of market access on household production and income by highlighting the inter-market access stratum differences on the set of control variables. The detailed analysis of the quantitative impact of market access on household production is taken up in Chapter IV; and the effect on household income (following several different definitions of income) is analyzed in Chapter V. The contribution of market access is measured through simple one-way analysis of variance methods as well as through multiple regression models. Chapter VI looks more directly at issues related to price formation, including an assessment of price consistency and the price awareness reported by the respondents. Subjective responses about perceived marketing problems and probable responses to improved market access are also analyzed in Chapter VI. Finally, Chapter VII pulls together the major findings of the study and reviews the policy implications and conclusions that follow. Several specific recommendations related to improving market access and to increasing farm income directly in the study areas are also duly noted.

B. RAPTI AND RCU PROJECT AREAS

(i) General Characteristics

1.26 The study area of this report consists of the reference areas of the Rapti Zone Integrated Rural Development (RAD) Project and the Resource Conservation and Utilization (RCU) Project.[12/] The former is a conventional integrated rural development project which covers the five districts of Rapti Zone: Dang, Salyan, Rolpa, Pyuthan and Rukum. RCUP also has

12/ Both projects were initiated in 1978 and are executed by His Majesty's Government of Nepal with funding from USAID.

the basic elements of a rural development project package, but the operational focus is on resource management and conservation programmes. Unlike RAD, the reference areas of RCU do not consist of entire districts, but two separate watersheds, covering parts of three districts. The Kaligandaki river catchment area covers Mustang district and the eastern half of Myagdi district; and the Daraundi river catchment area consists of the southern half of Gorkha district.[13/]

1.27 In Rapti Zone, Dang is an inner-terai district bordering Uttar Pradesh in India. It consists of two major east-west valleys (Dang and Deukhuri) which lie between the Churia and Mahabharat ranges. Most of the district lies at elevations below 1000 metres. The remaining districts in Rapti are from the mid-hill region of Nepal. In this area, topography and climate vary directly on a north-south axis. Salyan and the southern part of Rolpa and Pyuthan lie at elevations of 1000 to 3000 metres. Rukum is the northern most district with an elevation ranging from 3000 to more than 4000 metres.

1.28 Topography and elevation within the RCU area also vary on a north-south axis; but the differences are less extreme because the project area is drawn from a common watershed, dominated by a main river valley in both instances. Gorkha and Myagdi are hill districts. Southern elevations in both districts are quite low - (about 600 metres in Gorkha and 800 metres in Myagdi). Mustang lies to the north of Myagdi

13/ Nepal is divided administratively into 75 districts in 14 zones. The RAD and RCU project areas consist of eight districts (five in RAD, and parts of three in RCU), located in three different zones, all of which are in western Nepal (see Map. 1).

with two distinct geographic regions: (i) the trans-Himalayan plateau to the north; and (ii) the inner Himalayan valleys to the south. Most of the region lies above 3000 metres; but the population is concentrated in the Kaligandaki river valley and its tributaries with an elevation between 2500 and 3000 metres.

1.29 The revised estimates of the 1981 census put the total population of Rapti zone at 876,723. About 30% of this population is accounted for by the largest district of Dang. Salyan, Rolpa and Pyuthan are approximately equivalent in population size. Rukum is the smallest district with a population size of only 132,432. Using the Baseline Survey estimates of the average household size in each of these districts, the total population of Rapti consists of 168,607 households; again with Dang accounting for the largest share.

1.30 With a population of only 12,930, Mustang is the least populous district in the study area. The 1981 census estimate of the population of Gorkha is 231,294 and of Myagdi 96,904. But the RCU project areas do not include all parts of Gorkha and Myagdi districts. A recent estimate of the population within the panchayat boundaries of the project areas is not directly available. An estimate is derived from the electoral lists (prepared by the Election Commission for the 1982 local panchayat elections). In comparison to the Baseline estimate of households in the project area, the electoral list has a much higher number in both areas.

TABLE - 1.1 A

RAPTI ZONE POPULATION

	District Pop. (1981 Census)	Avg. Density (per/sq.km.)	Number of Households Baseline	'81 Census*	%Share (Census)
Dang	2,66,393	98	31,940	32,686	24.37
Salyan	1,52,063	104	27,157	24,023	17.91
Rolpa	1,68,166	89	27,835	26,821	20.0
Pyuthan	1,57,669	120	24,812	25,763	19.21
Rukum	1,32,432	46	17,210	24,800	19.49
Total	8,76,723	33	1,28,954	1,34,093	

*The number of households is estimated by dividing the census district population by the average household size indicated in the Baseline Survey.

TABLE - 1.1. B

ROUP AREA POPULATION

	District Pop. (1981 Census)	No. of Pan chayats in RCU Area	Number of Household Baseline (1978)	Electoral List '82	% Share (1982 List)
Gorakha	2,31,294	33	17,524	22,596	69.9
Mustang	12,930	16	6,668	2,343	8.8
Myagdi	96,904	17		6,895	21.3

1.31 Agriculture dominates the rural economy of Rapti and the RCU districts. Its two major components are crop cultivation and livestock rearing. The major food crops within the region are paddy, maize, wheat, millet, barley and potatoes. The relative importance of any particular item varies according to topography and climatic conditions. Paddy is the preferred subsistence crop

and is grown wherever land and climatic conditions are favourable. Only in the high altitude of Mustang is paddy not grown. In this trans-Himalayan district, the incidence of maize and wheat is also limited to the southern portion while the major crops in the northern section are phapar (buck-wheat) and uwa (naked barley). The highest proportion of land cultivation is taken up by maize in Myagdi, Rolpa and Pyuthan. The major crop in Salyan is wheat; and paddy in Dang and Gorkha. Both maize and wheat are equally important in Rukum. Oilseeds (mainly mustard) are an important cash crop in Dang.

1.32 The average size of land cultivation in the study areas, as estimated in the respective Baseline Survey, is reproduced in Table 1.3. The percentage distribution of households according to size-class intervals is also reported. The average size of land cultivation in Dang (35 ropani = 1.8 hectares) is significantly higher than in the seven hill districts. The average size in the Rapti hill districts range from the lowest 3.4 ropani per household (in Pyuthan) to 6.1 ropani in Salyan. Most of this variation should be attributed to sampling error because the Baseline samples were not only small in size but also based on dubious sampling procedures. Sampling error also accounts for the inordinately high average size of land cultivation of 19.3 ropani (= 1 hectare) in Gorkha. This average is as high as the 1971 national average of Nepal (which includes the weight of terai samples). The reported average size of 11.4 ropani in Mustang and Myagdi is more reasonable.

TABLE - 1.2

PERCENTAGE DISTRIBUTION OF HOUSEHOLD BY SIZE - CLASS OF LAND CULTIVATION

(land size and class intervals in ropani)

	Average Land size	Size class of household				
		Sub-marginal	Marginal	Small	Medium	Large
Class Intervals		below 0.2	0.2-4	4-10	10-20	>20
District		Percentage Distribution				
Salyan	6.1	16.0	39.8	28.1	11.0	4.9
Pyuthan	3.5	32.1	39.7	20.5 a/	5.6	2.2
Rolpa	5.3	12.6	48.6	26.5	7.0	5.2
Rukum	5.9	10.1	30.7	42.8	12.0	4.7
Gorkha	19.6	3.5	7.1	22.8	30.3	37.2
Myagdi Mustang	11.4	23.0	14.9	20.4	21.2	20.4
Size class intervals in Dang		below 2	2-20	20-47	47-100	>100
Dang	35.2	41.0	30.0	14.1	7.5	7.4

Source: APROSC, respective Baseline Survey, Table 2.1.7 (Rapti); Table 2.1.4 (RCU).

N.B. 1 ropani = 0.051 hectare; or approximately 19.7 ropani = 1 hectare.

a/ Incorrectly reported as 24.46 in Rapti Baseline Survey, Table 2.1.7.

1.33 The distribution of land ownership is skewed. Marginal and sub-marginal farmers account for more than 50% of the farm cultivating families in Salyan, Pyuthan, Rolpa and Rukum. The distribution is slightly less skewed in Rukum, and in Mustang and Myagdi. Most of these households cultivate more than 4 ropani. Gorkha, again, is the exception to the pattern of a skewed distribution with the largest number of households reported under the large size category (more than 20 ropani of land cultivation).

1.34 Because the size of land holding is very small most households have numerous other sources of farm production and income (even apart from livestock and horticulture cultivation). Multiple sources of income are a distinctive feature of subsistence agriculture. Substantial variation in the sources of household production and income is likely in the study area. This is an important economic aspect of the agrarian structure of a regional economy. The Baseline Survey for both the Rapti and RCU project areas report only the sources of household cash income. There are numerous problems in the definition of cash income adopted in the Baseline Survey,[14] nonetheless this information is reproduced below for reference along with the estimated total household income for the Rapti districts.

14/ The Baseline estimates of household cash income include sales of farm assets (including land) and loan receipts. The former is a "stock" adjustment which is not consistent with a "flow" measurement such as income. Credit received is also not a proper constituent of household income. Double counting occurs in the case of production loans because the increase in production and sales income due to the effect of credit is already counted. For the Rapti districts, an estimate of total household income is also made by adjusting the value of cash income upwards to take account of home consumed production. Total household income is not reported in the RCU survey.

1.35 The Baseline estimate of adjusted household income is Rs.3140 in Rapti. This is certainly a gross under-estimation because the value is equivalent to a per capita income of Rs.476 in Rapti. The estimated average rural per capita income in the Far Western Development region in 1977 is

TABLE - 1.3

SOURCES OF CASH INCOME AND TOTAL INCOME

Districts	Total Adjusted Income (Rs.)	Total Cash Income (Rs.)	Percentage Share of Cash Income from: Agriculture	Livestock	Veg. and Fruits	Wages	Trade/Business	Others
1	2	3	4	5	6	7	8	9
Dang	4228	2983 (70.6)	27.0	5.0	0.0	5.0	9.9	53.1
Salyan	2865	1512[a] (52.8)	4.0	5.9	2.4	17.7	28.3	41.7
Pyuthan	3798	2035 (53.6)	6.0	11.0	1.0	9.0	6.7	66.3
Rolpa	2128	1061 (49.9)	3.4	12.2	0.2	21.0	15.3	47.9
Rukum	2378	884 (37.2)	5.8	9.7	0.7	18.9	26.9	38.0
Gorkha	n.r	1753	17.0	11.0	1.0	23.0	10.3	37.7
Mustang, Myagdi	n.r	4853	9.0[a]	12.0	7.0	8.0	35.1	28.9

Source: APROSC, respective Baseline Survey; Table 3.55 (Rapti), Table 3.5.2 (RCU).

Figures within parenthesis in column 3 indicate the percentage of cash income to total adjusted income.

n.r = not reported.

a/ Incorrectly tabulated in Baseline tables.

Rs.880 which is 84% higher than the implied Baseline figure for Rapti.[15/] Nonetheless, on the basis of the reported household incomes, Dang is the most prosperous district followed by Pyuthan, Salyan, Rukum and Rolpa. The estimated household income in Rolpa is about 50% less than that of Dang.

1.36 The ranking of the Rapti districts is almost the same in term of the average household cash income. The average amount of cash income (Rs.884) and its proportion to total income (37%) is lowest in Rukum, perhaps due mostly to its remoteness and the induced greater subsistence-orientation. Estimates of total household income were not reported in the RCU Baseline. The average cash income of Rs.4853 in Mustang/Myagdi is substantially higher than in Gorkha or any of the Rapti districts. The primary reason for the high cash income in Mustang and Myagdi is the relatively higher contribution of trade and business cash income (35%).

1.37 Looking at the percentage contribution made by different sectors to the total cash income, the share of agriculture (crop production) is very small in all the districts of Rapti and RCU, except for Dang where this sector contributes 27 percent of total cash income. In Rolpa and Salyan, this sector contributes a negligible 2 and 4 percent respectively. The share of vegetables and fruits sales is not important in all the districts except Mustang where its share is 7 percent. The share of livestock income is only 5% and 6% in Dang and Salyan. In the remaining districts it is slightly higher, ranging from 10 to 12 percent.

15/ The estimate is from the 1977 National Planning Commission Survey cited in ADB/HMG (1982). The under-estimation of the average income in the Baseline Survey is more evident given that Rapti Zone is relatively more prosperous than the other zones in the far western Development Region (of 1977), and the fact that significant urban incomes must occur in the trading centers of Ghorahi, Tulsipur and Koilabas of Dang district.

1.38 Income from other sources constitutes a significant proportion of total cash income. The cash income generated from primary farm production activities (crops, livestock and fruit and horticulture) is about 32% in Dang. This is the highest share among all districts. In all other cases the most important source of cash income is something else: trade and business in Mustang/Myagdi, Salyan and Rukum; wages in Rolpa and Gorakha. The proportion of income derived from ancillary sources could be lower when compared to total household income, rather than its cash component. But still one expects that these sources make an important contribution to total household income.

(ii) Agricultural Marketing and Market Access

1.39 With the exception of Dang, the study locations are food deficit districts. Consequently, the agricultural marketing network is geared more towards "importing" than in transporting and selling grains out of the region. The net deficit of the major food crops in the four hill districts of Rapti zone is estimated to be about 31,000 mt. in 1981/82, in contrast to a net surplus of 27,500 mt. in Dang. The amount of this deficit is highest in Rukum (11,500 mt.) and lowest in Salyan (3,600 mt.). Rukum is deficit with regard to all the principal crops. The other districts are surplus producer of the secondary crops such as millet or barley, and sometimes of wheat (Salyan and Pyuthan). In the RCW areas, Gorkha and Myagdi are also net deficit districts while Mustang is deficit in rice only.[16/]

16/ There are estimates made by the Food and Agricultural Marketing Services Division (FAMSD) Food Balance for 1981/82 (mimeograph). The Mustang estimate can be questioned because consumption requirements are calculated with an estimated population of 12,300. This population estimate ignores the large volume of travellers and tourists to the region.

1.40 The motorized transportation network within both project areas is limited. The national East-West highway which runs through Dang valley is still under construction but it can carry vehicular traffic throughout most of the year. An all-weather road also links the two urban centers of Dang: Tulsipur, the zonal headquarters and Ghorahi, the district headquarters (population 19,271) to the East-West highway. A seasonal link between Pyuthan district (starting in Bijuwar) and Ghorahi and between the headquarters of Rolpa district and Ghorahi is also established. Rukum and the northern portions of Rolpa, Salyan and Pyuthan have no road access. There is no road access within the KCU project areas of the Kaligandaki catchment area also. Gorkha, on the other hand, is linked to the Kathmandu-Pokhara highway and to points further south in the terai.

1.41 In the context of Nepalese agriculture, the connection between proximity to a road or road access and increased surplus disposal of farm products is not as direct (nor as immediate) as expected.[17/] The road heads are more important as supply points or points of distribution for purchased commodities, including food items as well as agricultural inputs. Dang is the only district with surplus production and the main centres of Ghorahi and Tulsipur serve as supply points for other markets in the southern portion of the Rapti hill districts. But Dang itself receives grain from outside - from Nepalgunj and Butwal in the west and east respectively. Nepalgunj, in the adjoining district of Banke, is an important independent supply point for the western part of Rapti zone for both food and manufactured products.[18/] Narayanghat in the

17/ Cf. Blakie et.al who review the effects of road access with respect to the Kathmandu-Pokhara and Pokhara-Sunauli highway.

18/ APROSC, (1980) Feasibility Study of RAD Project; Vol.III. Annex 8.

central inner terai is the major supplier of food and other imports into Gorkha district, with Khaireni on the Kathmandu-Pokhara highway acting as a load breakage point. Myagdi has trade links with Pokhara in the east and the terai of Lumbini zone in the south (particularly Bhairawa). The same network also reaches further north into Mustang.

1.42 Most of the major market centres in Rapti and RCU areas are situated in the district headquarters. In Dang there are three major market centres: (i) Ghorahi, the district headquarters and major market which is centrally located, (ii) Tulsipur, west of Ghorahi with a road link; and (iii) Koilabas on the Indian border. Ghorahi and Tulsipur serve as retail outlets as well as wholesale supply points to both India and the northern hill districts of Rapti. Koilabas is an intermediary point for trade with India. In the hill districts the major market centres are retail bazaars. Some serve as transhipment points but wholesale marketing is limited. Such centres are Bijuwar and Khalanga in Pyuthan, Khalanga in Salyan, Liwang in Rolpa, Musikot and Chaurjhari in Rukum. Bijuwar in Pyuthan is the largest market and it is linked to Dang by a fair-weather road. In the RCU areas, the major market centres are Jomsom and Marpha in Mustang; Beni and Dana in Myagdi and Gorakhkali and Khaireni in Gorkha. Khaireni and Gorakhkali are linked by a motorable road. Both act as the supply point of food and other manufactured goods to the northern areas of Gorkha district.

1.43 It is customary to distinguish three tiers in the food marketing system in Nepal's terai.[19] This same structure can be assumed to operate in Dang. The three tiers are (i) primary

19/ Cf. APROSC (1982a).

level sales by the producers to local shopkeeper/merchants; itinerant traders, or agents; direct sales to consumers are also made in the local rural markets, including periodical hat bazaars; (ii) the secondary market where millowners and wholesalers purchase from the agents involved in the primary market; some direct purchases from large-producers are also made; (iii) the final market channel which distributes the processed grain (e.g. rice, flour etc.) through wholesalers and retailers to final consumers (including the government and export shipment).

1.44 The trading channels in the hill districts are more simplified. Food surplus households can usually sell locally to neighbours or to the village shopkeeper, who in turn, usually sells to the final consumers with further processing. Producers also sell directly to persons from other villages who come specifically to purchase grain. Even in remote areas, producers do not have to carry on a long-distance trade by themselves to sell off their surplus. In areas where a substantial seasonal surplus is generated (e.g. fertile river valleys), some primary level assembling is done for disposal outside the area by merchants and travelling traders. But in general, producers and agents who have contacts in other primary or secondary markets are minimal. Also, when food has to be brought into the hill areas, local shopkeepers usually deal directly with the wholesaler or supplier (usually located in the large hill towns such as Pokhara for Mustang and Myagdi, and in the terai).

1.45 Marketing of livestock products from the hills is even less structured. Some perishable items such as milk or meat

are sold locally. Most of the milk surplus is, however, turned into ghee which is then sold over long distances by the producers themselves. The important markets for ghee in Rapti zone are Ghorahi in Dang and Butwal and Nepalgunj in the neighbouring zones. For some reason, there are few intermediaries in the livestock marketing channel. Sales are made directly by the producer to the final marketing channel in urban centres or export-collection points.

1.46 Apart from food crops and livestock products, oilseeds and dried ginger are important cash crops that enter the marketing network in Rapti. Oilseeds are important in Dang only. There is no specific information about the marketing channels for oilseeds; but one can assume that it follows the same pattern of food crops. Due to the limited oil-pressing capacity in Dang or the neighbouring districts, oilseeds are exported to India while oil is imported. Koilabas in Dang is an important centre for this trade. Information on the dry ginger trade is also limited. It is completely export oriented. 521 metric tons of ginger were exported through the Koilabas and Nepalgunj customs points in 1978/79.[20] A substantial portion of this can be assumed to originate in Rapti zone. One can assume that the ginger trade parallels that of export-oriented livestock products like ghee.

20/ Cited in APROSC, Feasibility Study of Rapti IRD Project vol.III Annex 8. One should also note that the bottom has fallen off the overseas export markets for Nepalese ginger after 1980/81. Adverse price trends have reduced the total export of dry ginger (cf. IDS, 1983). Specific production and sales information concerning ginger was not collected in the survey for this study.

(iii) Agricultural Marketing and Pricing Policies

1.47 The overall framework of agricultural marketing and price policies that operates in the Rapti and RCU project areas is no different than in the national context. The Rapti IRD Project has a small market development component which basically concentrates on establishing new rural periodical (hat) markets. There are no project-specific policies or institutions which alter the overall context of producers' incentives or marketing structure in the study area.

1.48 At the national level, one can identify four currently operative policy elements or modes of intervention in the rural marketing/pricing framework. These are:

(i) announcement of minimum producer prices by the Government for rice, wheat, maize and the major cash crops. This has operated since 1977/78. These prices, however, are not support prices backed by public sector purchases at the announced prices when market prices fall below them.

(ii) policies (rather, the periodical flip-flops) concerning exports of food grains from Nepal. Tariffs, levies and other taxation of exports are periodically changed. Exports of rice are most affected (including a complete ban for most of the 1982/83 period).

(iii) public sector purchase and distribution of food grain. The activity is carried out by the Nepal Food Corporation (NFC) which purchases grain (mostly from large millowners and exporters) and sells in the northern regions at subsidized prices.

(iv) subsidized public sector distribution of modern agricultural inputs (chemical fertilizers, etc.)

including institutional credit at below market interest rates.21/ The institutions involved are the Agricultural Inputs Corporation, ADB/Nepal, and the local Sajha (farm co-operative) societies.

1.49 These policy issues are discussed more fully in Chapter VII. The general consensus seems to be that the effect of these specific issues on producers incentives and farm level production is limited. Minimum price announcements are not supported. Free market transactions done through private channels (with an eye to Indian border prices) predominate. The effect of the activities of the Nepal Food Corporation is also minimal, with the exception of Kathmandu Valley. The amount of food distributed by the NFC is typically less than 5% of total food production with the study region.22/ Policies controlling export trade also do not have a firm impact because most food grain trade is with India; and the open-border trade often by-passes government regulations. Finally, access to and the use of subsidized modern inputs such as fertilizers and institutional credit remain limited.23/

21/ Because even private sector transportation is affected by government subsidies (e.g. reduced price of diesel and air cargo rates to remote areas), an indirect subsidy is involved in all movement of farm output and inputs.

22/ See Appendix C. The figure is slightly higher for Mustang but here one needs to account for the large number of non-residential consumers in the form of tourists and other travellers.

23/ Nepal has the lowest use of chemical fertilizer per land unit in South-Asia. In addition, the distribution of fertilizer and other inputs remain concentrated in Kathmandu Valley. Institutional credit is available to only 24% of farm families of whom 74% are large farmers (cultivating over 20 ropani in the hill and 53 ropani in the terai). This data and a review of agricultural sector institutions and policies are given in ADB/HMG, Nepal Agriculture Sector Strategy Study, 1982.

1.50 The apparent limited impact of such national policy interventions raises serious questions about how effectively the intended results of any new marketing and price related policy innovations can be realized. The fragmented nature of regional, and even district level, marketing networks present additional problems because even effective policies need not have an uniform impact in all regions of the country, or on all size classes of producers. Agricultural marketing and producer price policies that are limited to specific target groups - whether identified by area or by size or income levels - can be an important, perhaps even necessary, aspect of the overall policy framework. Current policies have not emphasized the role of selective interventions in agricultural marketing; and doubts remain about HMG's willingness to engage in and ability to effectively manage target-group specific discriminatary marketing and price policies. Chapter VII of this report addresses some of these issues and the options available. Firm conclusions and recommendations, however, can only follow from more detailed studies of regional marketing channels and empircal assessments of the degree of market integration and factors involved in regional price formation.

CHAPTER - II

METHODOLOGY AND SAMPLING DESIGN

A. METHODOLOGICAL ISSUES

2.1 The primary objective of this study is to assess the extent to which better market access and market integration accounts for observed differences in household production and income within representative samples of Rapti and RCU area households. It seeks to test for and measure quantitatively the strength of an expected positive relationship between market access and farm production. The precise mode through which the observed relationship occurs - i.e. whether it is due to price factors, including greater market intelligence and price consistency or to numerous other location specific effects - is also of great interest. On the basis of the validity and generality of these relationships, specific policy inferences and operational conclusions are to be drawn about the role that marketing and price policy can play in stimulating agricultural production within the region. If vindicated, specific changes and improvement in the set of government policies affecting producer incentives, market access and marketing costs are also to be identified.

2.2 To verify the central hypothesis of the study - i.e. market access has an independent positive impact on household production - a research methodology has to be adopted which isolates as far as possible the <u>ceteris paribus</u> effects of market access from the entire range of other variables affecting farm/household production and income. Since market access is to be interpreted primarily as a location-specific variable, a methodology based on comparing household production and income of sub-samples from <u>predefined market access strata</u> is adopted. The logic of such a design is, however, mitigated by the following problems:

(a) problems related to the definition and measurement of market access which, in turn, lead to problems in interpreting and classifying households according to market access strata.

(b) though a set of control variables can be readily identified (whose effects are to be separated out from the effects of market access), the joint covariation of these variables with the selected interpretation of market access is not known. This leads to problems of identifying the independent effects of market access because data drawn from random sub-samples of different market strata may not be comparable on certain key control variables.

(c) problems that occur in the methodological definition and estimation of household production income, in a setting where farm production is primarily geared towards self-sufficiency. Production is carried out through the use of family resources for which the estimated average prices may not reflect the actual opportunity cost of resources utilized by the household. When market participation is not only limited but also constrained by numerous imperfections, market prices are hard to define. Moreover, such prices may not be the appropriate units through which the value of household production and income should be computed.

2.3 These problems have not been satisfactorily remedied in this study. The type of difficulties noted in (c) above is generic to all exercises that generate estimates of household production and income from survey data in the context of traditional agriculture. Apart from problems in the interpretation of prices for farm output as well as for factor inputs, difficulties arise in the treatment of joint production (particularly of crops and cottage industry type ancillary activities), the value of by-products used as intermediate goods (e.g. manure, straw), payments and receipts in kind, the incidence of tenancy etc.

2.4 These, and other problems, are noted in great detail in almost all reports based on household survey information - including the Baseline Survey for Rapti and RCU zones. Unfortunately, inspite of the frequent mention, a serious effort has yet to be made to develop a systematic methodology to be followed in estimating household production and income given the conditions and the type of household activities that occur in Nepalese hill and terai farms. This study is hardly the place to initiate such methodological adjustments.

2.5 Because of the extensive coverage of the survey (a projected sample size of 1600 households spread across eight districts) and the need to obtain detailed information on market participation, the questions dealing with household production and income sources were limited in scope.[1/] The value of household production is estimated from three sources - the value of crop production (including potato), livestock production, and gross sales of fruits and vegetables. Crop production is valued at local village level harvest-period prices. Livestock production is estimated on the basis of total milk production and sales of other non-milk based livestock products as well as live animals. When these items are not produced or sold then a proxy estimate for livestock production is derived as a proportion of the total value of livestock holdings. Details on the amount of vegetables and fruits grown (or gathered) were not asked because of the large variety of items and additional problem of imputing average market prices for such seasonal and perishable products.

1/ The questionnaire was designed so that all the information was to be collected in a single interview for a household. A lengthy questionnaire (exceeding 30-35 minutes of interview time) was purposely ruled out to reduce the likelihood of respondents not sitting through the entire interview.

2.6 As for the estimation of household income, farm management studies make use of several standard definitions of net farm income. These depend basically on what categories of costs are deducted from the gross income (the total value of production).[2/] Unfortunately, the estimates of adjusted household income made in the Baseline Survey do not conform to any of these standard procedures. It lumps together income from annual production activity with income from stock adjustment items (e.g. sale of land) and with remittances. The distinction between farm and non-farm income sources is made only for income received in cash. Although the basis for comparability with the Baseline data would be weakened, a different method of estimating income is used in this study.

2.7 For any given farm, one can conceptually think of the net farm output or "social income from farming" which refers to the remuneration of all resources used in the production process. This total remuneration may be shared by the government (taxes), landlords (rents), credit agencies (interest), input suppliers (factor costs), hired labour (wages); and finally, the farm operator's family. The farm household income can then be perceived as that part of the social income which accrues to the farm operator's family - which is the residual after other claimants have been paid off.[3/] In this manner one doesn't have to impute any market value to home produced inputs used in the production process (e.g. manure, family and own-bullock labour etc.).

2/ cf. I.J. Singh (1977) and Kahlon and Singh (1980).

3/ Such an interpretation of household income has been used in the rural household survey carried out by ARTEP/ILO in Nepal in 1974. See ARTEP/ILO, Nepal Rural Household Survey: 8 villages; Bangkok, June 1976.

2.8 This method was applied to the main items of household production - crops, livestock and fruits and vegetables. Firstly, all in-kind payments (for rent, wage payments, etc.) are subtracted from gross production quantities. Further adjustments are made to account for losses during storage and seed rates to arrive at net household receipts for each crop. Then from the value of net household receipts, the remaining cash expenses incurred in farm cultivation and livestock (e.g. for hired labor, fertilizers, seed, hired bullocks, irrigation, credit, etc.) are subtracted. The residual represents household income from primary farm production activities. (It includes crop production, livestock, and fruit and vegetable sales).

2.9 The additional sources of household income have been classified as follows:

(i) other farm income which is gross receipts on agricultural wages and rentals of bullock and farm implements.

(ii) non-farm productive income includes income from non-agricultural and/or seasonal migrant wage-employment, salaried earnings, income from cottage industry activities, retail shopkeeping and other service enterprises, and interest from money-lending.

(iii) non-productive income which is pension and remittances.

In Chapter V several different categories of total household income are developed on the basis of which of these additional sources of income are included. This four-way distinction of income sources is made because it is not clear that market access would have a uniform impact (if any) on these four conceptually different sources of household income.

2.10 With reference to the other methodological problems noted above (items (a) and (b) in paragraph 2.2), they occur primarily because prior information on the type and nature of market access relations in Rapti and RCU areas is too scanty. Our interpretation of market access and its typology could not be based on a pre-existing verified set of relationships.

2.11 In general, the predominant effects of market access on household production can be related to favourable prices - e.g. higher prices for farm output and cheaper prices for factor inputs. Market access, of course, is a multi-dimensional concept which includes various non-price elements such as access to institutional credit or agricultural extension services, the timeliness of input deliveries, qualitative differences in the mode of transportation, etc. But taking a broad enough interpretation of the production process, one can place a premium (or price) on the availability and use of such "inputs" as extension services, credit, and timely deliveries to the market. Such a price-based interpretation of market access might have been an interesting approach to explore if only the basic foundation for such an analysis - the spatial distribution of producer (farm gate prices) for the major crops within the study area of Rapti and RCU - was known. Unfortunately, even the Baseline Survey volumes do not report the village level prices for the sampled panchayats, though this information about prices was collected and used to estimate the value of household production and income.[4/]

4/ Other sources of price information also are of little use. Both the Department of Agriculture Marketing Services and the Rastra Bank collect data on agricultural prices; but these are limited to a few major towns and are basically estimates of consumer retail prices. In any case none of these points are within Rapti and RCU project areas.

2.12 On the other hand, should information on the spatial distribution of producer prices be available, additional difficulties would still occur. Estimated "average" village level prices (which may or may not take into account seasonal as well as inter-household variation) can be far removed from the required estimates of an "equilibrium" or market-clearing price. The latter concept implies a price supported by an effective demand at the stated price. When production is oriented towards household self-sufficiency and when villages are not integrated into one common marketing network, limited exchanges may occur in a particular village at a specified price. But should producers seek to dispose of all their output at this stated price, it would not generally be supported for the lack of a sufficient volume of demand to absorb all the quantities offered. In such situations, comparing reported average prices across villages and using them to define market access conditions can be very misleading. The reported village prices are often higher in the more remote food-deficit hill areas; but this is certainly not a proper indication of better market access. A price-differential based system of classifying market access would appear to be meaningful only within a unified marketing network with some elements of competitive arbitrage. The presumption is that such conditions do not hold in the study areas of Rapti and RCU.

2.13 An alternative method of classifying market access is distance to a market centre (either in physical length units or in travel-time). This is very closely related to the price-differential measure. In fact, under competitive conditions in a unified marketing network where spatial price differences reflect transport costs, which, in turn, are

related directly to distance, the two methods are equivalent. So the distance approach suffers from similar problems when applied to the fragmented and non-competitive market structures of the study region. Since a common central market mode cannot be identified, the distances to various different local markets are usually not comparable because they are not equivalent on the volume of sales they can support. Here also, additional information on the effective demand in each of the localized market outlets is required. Apart from Dang, one expects that sales are usually made locally in the village to neighbours or to travelling traders and their agents. So additional problems occur in identifying the relevant or price determining market for a particular village or locality.

2.14 Rural periodical markets (hats), where traders gather on certain days at a specific location, are usually an important source of local surplus disposal in Nepal. But for reasons that remain largely unspecified, periodical markets have not developed fully in the western region of the country. In all of Rapti zone only two hat bazaars are identified; and in the RCU areas, one occurs in Mustang and none in Gorkha and Myagdi.[5/] In the context of this study, market access cannot then be usefully defined in terms of proximity to this type of rural markets.

2.15 In view of these constraints, a rather ad hoc manner of assessing market access in the Rapti and RCU zones has

5/ These numbers are in comparison to a total number of 639 periodical rural markets identified in Nepal as of 1980. Of this, 544 are situated in the Central and Eastern Development Region of the country. cf. FANSD (1980) Appendix 1.

been adopted in this study. The main factors used are proximity to large retail consumer markets (bazaars) and the type of transportation available. In a region of widespread food scarcity, the mere existence of retail outlets for food and other basic consumer products does not, however, mean that a significant proportion of local production is exchanged in these markets. Food is usually "imported" from markets outside the region - e.g. Nepalgunj for the Rapti Hill districts, Narayangarh for Gorkha and Pokhara for Mustang/Myagdi districts. Because of economies of scale in transportation or because of the absence of local milling and processing facilities, the retail outlets may operate independently of the seasonal surpluses generated in the immediate surroundings. On the other hand, the retail bazaars are situated in areas of larger population concentration and in the district capital and other important trading centers. This usually implies better transportation facilities, availability of extension services, easier and cheaper access to agricultural inputs (e.g. fertilizers). All of these are factors normally associated with better market access.

2.16 For Rapti zone, the major market centres for each district as well as a functional score for a total of 13 market centres are identified in the Feasibility Study of Rapti IRDP.[6/] This offers an initial basis from which the market access of selected panchayats can be judged. Sampling in Rapti reflects this prior information. Market access within the RCU districts is identified on a more ad hoc basis but is consistent with the approach used in Rapti.

6/ APROSC (1980b), Volume III, Annex 8.

Proximity to the main district markets and motorized transportation is used to distinguish market access strata within Gorkha district. In Myagdi and Mustang, the traditional north-south trade route of the Kaligandaki valley (with an eastern branch to Pokhara) is used to classify market orientation.

B. SAMPLING DESIGN[7/]

2.17 The terms of reference for this study specified that the household samples be drawn as follows:

a. independent samples of approximately 200 households were to be selected from each of the five Rapti districts and the 3 district regions covered by the RCU project, making a total of approximately 1600 households.

b. the sample be drawn as a representative sub-sample of the households selected for the Baseline Survey of both regions. This constraint was imposed to maintain some degree of comparability between these two surveys and also to avoid duplication of data already collected in the Baseline.[8/]

2.18 The sample design adopted for this study is broadly consistent with the specifications noted above, but some specific changes which were deemed necessary have been made.

7/ The sample design procedures are given in more detail in Appendix A. This section discusses primarily the justification and major assumptions made, and briefly summarizes the methods used.

8/ The Baseline sample for Rapti consisted of 1635 households selected from 43 of the then existing 216 village panchayats. The RCU sample of 522 households was drawn from 18 of 59 village panchayats.

The intention noted in (a), namely, that the study maintain a district specific sampling framework, is adopted. Pooling district samples is more likely to produce higher variance in ecological and topographical factors which can override the effects of market access. Moreover, it is relatively easier to assess and define the relative market access characteristic of sample sites within a district than among sites scattered over all the districts in the study area.

(i) District Sample Size

2.19 Though independent district samples are to be drawn, there is no overriding reason why each sample should be equal (200 households). Ideally, the district sample sizes should reflect the within-district diversity in market access characteristics. A given total sample size is more efficient if it is allocated proportionately to the range of differences in market access expected within a particular district.

2.20 Market access was assumed to be most diverse in Dang in Rapti, and in Gorkha among the RCU districts. Both of these districts are also the most populous in their respective region by wide margins. Conversely, the least populous district - Rukum and Mustang - apparently have the smallest relative differences in market access within the relevant district location.[9] In the absence of sufficiently detailed prior

9/ Rukum can safely be classified as uniformly remote though some distinction between the western (with a trading orientation south to Salyan and beyond) and the even more remote eastern zone of the district can be validly made. For Mustang, only the area south of Muktinath and Kagbeni was considered relevant for this study. RCUP activities are concentrated in this area. The northern part represents an altogether different socio-economic and ecological zone which is very sparsely populated. Market access in the southern zone is quite uniform because almost all communities are located on or have easy access to the traditional Kaligandaki Valley trading route.

information on the different type of market access relations within a district, the household population in a district is taken as a proxy for the diversity of market access characteristic within the district. The larger the household population of a district the greater this variance, thus requiring a bigger sample size.

2.21 The sample size of 1000 households for Rapti and 600 for the RCU zones is allocated accordingly on the basis of estimated household population. Including an upward adjustment for incomplete or incorrectly filled questionnaires, the following district sample size targets were derived:

Rapti District		RCU Areas	
Dang	275 households	Gorkha	260
Salyan	205	Myagdi	195
Pyuthan	195	Mustang	170
Rolpa	205		
Rukum	170		
	1050		625

(ii) Market Access Strata

2.22 The second specification of sampling from within the Baseline survey sample households also was not followed wholly because it is a very restrictive imposition in many districts. Market access was not adequately represented in the Baseline sample survey. In some cases there was no Baseline sample location situated in or very close to the main retail market centres. It was decided that in every district a sample be drawn from the district headquarters and the main retail market centre (if different from the location of the district headquarters). The Baseline list

of panchayats was, thus, supplemented by adding these sample locations if they were not already included in the Baseline survey.

2.23 A second type of adjustment was also necessary because administrative changes in panchayat boundaries and names have occurred after the Baseline survey period. It was not possible to identify the current name and location of all sample sites in the Baseline survey. The sampling basis for this survey, therefore, consisted of an amended list of the original Baseline sites and additional sites (e.g. the district headquarters and other major market centres) selected purposively.

2.24 The list of possible sample sites of panchayats derived above was stratified on the basis of district market access characteristics. As noted before, market access stratification in this study primarily reflects proximity to major retail markets or bazaars within a district. Three different market access strata were identified initially for each district. Stratum I (MS I) represents the most favourable access, and it consists of households within the panchayat boundaries of the district headquarters or the main district bazaar, if the latter is in a different location. Stratum II (MS II) consists of locations in or near other important bazaars or road-heads, or sites with easier transportation in general. Stratum III (MS III) represents the least favourable market access conditions. In a region where the physical terrain is difficult, marketing and transportation infrastructure minimally developed, and actual market participation of farm households by way of sales is very limited, stratum III can be appropriately taken as the residual category. All

panchayats are in MS III unless there is some overriding indication that it has developed a more direct and easier market access, in which case it is placed either in MS II or MS I.[10/]

(iii) Sample Panchayats in Rapti Zone

2.25 The major retail market centers for the Rapti districts are identified and also ranked in terms of size and area served in the Feasibility Study of Rapti Zone IRDP Project.[11/] This information is used to sort the possible sample panchayats into the three market access strata defined above. From this stratum-wise classification, the sample locations for this study were purposively chosen. The sample choices were often self-selecting because only one or two panchayats could be placed in certain market access stratum. Because of the expected greater diversity in market access characteristics within the MS III stratum (since it is the residual category), at least three different MS III sample panchayats are selected. An important consideration was to minimize clustering of sample sites in one particular area within the district. Ecological and altitudinal variation were expected to be

10/ Initially three different market access strata were identified for each district; but some changes in this classification have been made in the subsequent analysis reported in this study. The major adjustment is that the MS I category (the most favourable market access stratum) has been dropped in Rolpa and Rukum because it is inappropriate in these two districts in comparison to the other MS I sites in Rapti. All of the sample sites in Rolpa and Rukum are placed either in MS II or MS III. In Pyuthan, the district headquarters (Khalanga) has been placed in MS II rather than in MS I for a similar reason. These changes and their justification are given in detail in Appendix A, part II.

11/ APROSC (1980b); Vol. III Annex 8. It also discusses the Marketing Component of the Rapti IRD Project.

TABLE - 2.1

SELECTED SAMPLE PANCHAYATS: RAPTI ZONE

District/ Stratum	Sample Panchayat	Location/Description
DANG		
MS I (2)	Ghorahi Tulsipur	district headquarters/largest bazaar zonal headquarters
MS II (2)	Manpur	on the Ghorahi - Tulsipur road in Dang Valley
	Sonpur	in Deukhuri Valley on the East-West highway; and with rea ly access to the Koilabas-Ghorahi road
MS III (3)	Hansipur	eastern Dang, touching Pyuthan district, with some hilly tracts
	Rajpur	south-west location in Deukhuri Valley (south of the Rapti river).
	Goltakuri	extreme western Dang Valley
SALYAN		
MS I (1)	Khalanga	district headquarters, main market centre
MS II (2)	Kajeri	adjoining panchayat of Khalanga in the north
	Phalabang	south-east panchayat touching Dang district in the south.
MS III (3)	Badagaon	north-central location, bordering Rukum
	Sivarath	north-eastern location, bordering Rolpa
	Ghajari-pipal	western most panchayat, touching the Bheri river in the west.
PYUTHAN		
MS I (1)	Bijuwar	largest retail market centre; linked to Ghorahi in Dang by a fair weather road
MS II (2)	Khalanga	district headquarters situated on a ridge across the river from Bijuwar
	Tiram	south-western location touching Dang; located on the Bijuwar-Ghorahi road
MS III (3)	Baraula	south-east location; adjoining Argha-Khanchi district in Lumbini zone.

TABLE - 2.1 (Contd)

District/ Stratum	Sample Panchayat	Location/Description
	Lung	central Pyuthan; 1½ days north of Pyuthan Khalanga
	Syaulibang	northern most panchayat of Pyuthan
ROLPA		
MS II (2)	Liwang	district headquarters, largest market centre; fair weather road connection to Dang
	Khungri	southern panchayat on the Ghorahi-Liwang road; adjoining Liwang in the south
MS III (4)	Harjang	north-eastern location; 2 days walk from Liwang
	Dubidada	south-east of Liwang
	Mirul	extreme northern panchayat bordering Rukum
	Isiwang	north-western location
RUKUM		
MS II (2)	Khalanga	district headquarters, largest market centre
	Chaurjhari	south-western location, on the bank of the Bheri river; site of a STOL air strip
MS III (4)	Syalapakha	adjoining Khalanga on the north-east
	Garayala	west of Khalanga, on the bank of the Sano Bheri river
	Magma	north-east of Khalanga; one day's walk
	Athbisakot	further north from Magma.

N.B. The number enclosed in parenthesis is the number of sample locations in each stratum.

significant within all districts (except Dang). Though these factors have not been directly controlled by further stratifying the sample design, the purposive selection of sample sites reflects this concern. The selected sample sites for Rapti zone according to market access stratum are noted in Table 2.1 with a brief locational note.

(iv) Sample Panchayats in the RCU Areas

2.26 Prior information on the relative ranking of different market centres within the RCU areas was not available. The Baseline sample of panchayats for the RCU areas did not provide an adequate representation of market access characteristics in these district. It had surveyed from only three panchayats in Mustang district. Also the recent opening up of the Gorkha - Narayanghat road made motorable transportation available to many panchayats in Gorkha. To capture its effects, market access stratum and sample panchayats in Gorkha were defined and selected independently of the Baseline sample, after preliminary observations and discussions with local officials in Gorkha.

2.27 The classification of market access in Gorkha is similar to the ones made for the Rapti districts. The district is served by two road networks: the Kathmandu-Pokhara (Prithvi) highway which runs parallel to the southern border of the district, and the recently opened highway linking Gorakhkali, the district headquarters and main bazaar, to Khaireni on the Prithvi Rajmarga, and points further south. Khaireni is an important load-breaking point on this network. As in the Rapti districts, Gorakhkali, the district headquarters, is one of the sites selected for stratum I. Taranagar, which

is immediately south of Gorakhkali is the second MS I site. Taranagar has ready access to the Gorakhkali market and to points south through the road network.[12/] Four sample sites were selected to represent market access stratum II. Two of these represent the southern panchayats bordering the Prithvi Rajmarga, and two others from the central group of panchayats within a day's walk from the Gorakhkali market and road access. Three MS III sites were selected from the panchayats north of Gorakhkali - one of which is from the extreme north (Barpak).

2.28 Market access stratum classification for the Mustang and Myagdi portion of the RCU area reflects to a greater extent an existing trading network. The alignment of the study area - the Kaligandaki watershed - is parallel to the main north-south trail which follows the Kaligandaki river. In Myagdi, an eastern fork of this branches out to Pokhara, while the other route continues to Beni, the district headquarters and main market centre, and further south.

2.29 Beni was not included in the RCU project area and thus could not be selected for the study. Instead the two nearest southern-most panchayats of the RCU area - Ghatan and Piple - represent MS I sites in Myagdi. Of the three MS II sites, one is in the main Kaligandaki trail while the other two are on the Pokhara branch. The three MS III sites are all off the main trail - two in the west and one in the east.

12/ In contrast to the terraced hill plots of Gorakhkali panchayat, cultivated land in Taranagar consists primarily of low-lying paddy fields on the eastern bank of the Daraundi river.

TABLE - 2.2

SELECTED SAMPLE PANCHAYATS: RCUP AREA

District/ Stratum	Sample Panchayat	Location/Description
GORKHA		
MS I (2)	Gorakhkali	district headquarters, largest market; terminal point of highway.
	Taranagar	on the eastern bank of the Daraundi river, below Gorakhkali.
MS II (4)	Bungkot	directly east of Gorakhkali by about 8 miles.
	Amppipal	north-west of Gorakhkali; 7 hrs. walking time.
	Taklung	south-eastern corner (of RCUP area); across the Trishuli from the Prithvi Highway.
	Deurali	southern location; adjoining Khaireni
MS II (3)	Barpak	extreme northern location (within RCUP area).
	Swanra	mid north-eastern panchayat; 1½ days from Gorakhkali.
	Jaubari	mid north-western location.
MYAGDI		
MS I (2)	Piple Ghatan	both are southern most panchayats; close to Beni bazaar.
MS II (3)	Dana	northern Myagdi; on Kaligandaki valley trail
	Shikha	eastern panchayat, on the main trail from Pokhara.
	Begkhola	central Myagdi; on the Kaligandaki valley trail south of the split with the Pokhara branch.
MS III (3)	Kuinemangale	extreme western part of Myagdi (within RCUP area).

TABLE 2.2 (Contd)

District/ Stratum	Sample Panchayat	Location/Description
	Narchyang	east of Dana; located off the Pokhara trail
	Pakhapani	south-west location (within RCUP area)
MUSTANG		
MS I (2)	Jomsom	district headquarters main bazaar.
	Marpha	populous panchayat, 2 hrs. south of Jomsom bazaar.
MS II (2)	Lete	extreme southern location, western bank of the Kaligandaki river.
	Kunjo	east of Lete, on a tributary valley
MS III (3)	Kagbeni	5 hours north of Jomsom, in Kaligandaki river valley
	Muktinath	eastern ridge of Kaligandaki valley, above Kagbeni
	Jhong	on tributary valley of Kaligandaki, north-west of Muktinath.

N.B. Numbers within parenthesis indicate the number of sample locations per stratum.

2.30 The Mustang sample is drawn only from among the panchayats south of Kagbeni and Muktinath. Identifying market access strata within these lower panchayats in Mustang is slightly problematic because all sites have easy access to the Kaligandaki valley trade route; and physical distances between them are small.[13/] Jomsom and its immediate southern neighbour, Marpha, are taken as MS I sites. This area has acquired a new marketing dimension because of the additional demand created by an increasing tourist traffic. The other two market strata are defined in terms of a north-south axis from Jomsom. Although travel time to Jomsom is equivalent, the southern panchayats have an easier access to Pokhara and other points in the south.

(v) Final Sample Size

2.31 Details on the location specific targeted and final sample size are given in Appendix A. Table 2.3 below summarizes the resulting final sample by market access stratum in each district. The final sample size is the actual number of households that are incorporated in the statistical analysis of the study. It differs from the targeted sample size because, as anticipated, a few questionnaires were incomplete or were invalidly filled in. The final sample was also changed due to two adjustments that were made after the survey:

(i) Survey supervisors had been instructed to exclude households cultivating less than 4 ropani of land

13/ All panchayats in this area are within a day's walk from Jomsom which is the district headquarters and the main bazaar; and within two days walk from each other.

(the Baseline definition of sub-marginal farmers).[14] This limit proved too restrictive, especially in Rukum and Mustang. Some ambiguity also arose in evaluating households which cultivated less than 4 ropani but which received rental income from other land rented out to tenants. A new effective land size measure was defined as the sum of self-cultivated land and 50% of rented-out land. All households which had less than 3 ropani on this index were dropped from the final analysis.[15]

(ii) households who had migrated to the sample location within the last two years were also dropped from the analysis.

2.32 The final sample consists of 1606 households - 1003 in Rapti and 603 in the RCU zones.[16] The highest district sample size is in Dang (271 households) and Gorkha (252); while the lowest is in Mustang (160) and Rukum (148). The minimum sample size in any market access stratum is 39 - which is adequate for meaningful statistical inference on inter-stratum comparisons. Combining both regions, about 25% of the total sample (403 households) are located in stratum I; 34% (550) in MS II, and the highest proportion 40.7% (653) is in MS III.

14/ The purpose of imposing a minimum size of land cultivation is to confine the sample to households with a sufficient productive base so that the effects of market access on household production and income can be detected more clearly Resource-poor households are more likely to be poor irrespective of their location.

15/ The 50% value of land rented out is used on the presumption that the usual rental payment is 50% of the main crops. To maintain comparability with the other districts, land size in Mustang is defined only in terms of land given to crops. Households who have only orchard land no matter how substantial - are excluded. (Income from the sale of fruits and other products derived from fruits have been included, however, in the analysis of household income and production)

16/ 46 households were dropped under the land size limit. The highest number (23) of these households were in Rukum. Only 3 households were dropped under the migration constraint.

TABLE - 2.3

FINAL SAMPLE DISTRIBUTION

(number of households)

Districts	Market Access Stratum I	II	III	Total
Dang	108 (39.8)	59 (21.8)	104 (38.4)	271 (27.0)
Salyan	53 (27.0)	69 (35.2)	74 (37.8)	196 (19.5)
Pyuthan	59 (31.1)	57 (30.0)	74 (38.9)	190 (18.9)
Rolpa	-	97 (49.0)	101 (51.0)	198 (19.7)
Rukum	-	53 (35.8)	95 (64.2)	148 (14.6)
Rapti Total	220 (21.9)	335 (33.4)	448 (44.7)	1003
Gorkha	72 (28.6)	104 (41.3)	76 (30.1)	252 (41.8)
Myagdi	49 (25.7)	72 (37.7)	70 (36.6)	191 (31.7)
Mustang	62 (38.7)	39 (24.4)	59 (36.9)	160 (26.5)
RCU Total	183 (30.3)	215 (35.7)	205 (34.0)	603
Grand Total	403 (25.1)	550 (34.2)	653 (40.7)	1606

Figures is parenthesis are percentage of the district sample in a particular stratum (row percentage) except for the last column. This percentage is the relative share of a district sample in the Rapti or RCU total sample (column percentage).

(vi) **Survey Coverage**

2.33 The survey instruments for this study consisted of a household questionnaire written and administered in Nepali and a separate village level questionnaire. The interviews were carried out in several shifts for the 55 sample sites identified above. The village-level questionnaire was personally filled in by the survey supervisor through an interview with a local panchayat official or an accepted village elder. Three separate survey teams covered the five districts of Rapti in March-May 1983. Myagdi and Mustang were also surveyed separately in March-April and June respectively. Gorkha was split up between two teams which were in the field in May and June of 1983.

2.34 In the household interview any information related to an annual period was collected with reference to a 12 month cropping cycle from January 1982 to December 1982; i.e. Push 2038 to Mangsir 2039 in the Nepali calendar. This reference point usually represents the harvesting of the summer crops, primarily of paddy. Production information in the survey is in relation to the winter crops planted in the winter of 1981/82 and the summer crops of 1982. Where harvesting time varied due to local conditions or when the winter crop of 1982/83 was already harvested at the time of the survey, the information collected was for the previous winter plantings of 1981/82. This was done to ensure uniformity in time period as well as weather conditions.

2.35 It should be noted that the summer crop of 1982 was adversely affected by a bad monsoon, especially in western Nepal. Though the production and income estimates based on

this cropping cycle cannot be termed normal, no attempt has been made to adjust for the bad weather conditions. The alternative of collecting production data as an average of the past 2 or 3 years was not considered feasible because of the expected recall problems for the respondents and because of what would have been a lengthy and costly survey schedule. On the other hand, there is no a priori basis to expect that the general effects of the bad monsoon of 1982 creates a systematic bias in this analysis with regard to the comparison among different market access strata within a district. Bad weather may have affected some districts and not others; but there is not sufficient basis to claim that within a district areas with and without market access were affected differently.

C. TYPE OF STATISTICAL ANALYSIS AND LEVELS OF INFERENCE

(i) District level statistical inference

2.36 The primary purpose of the statistical analysis in this study is to uncover the inter-market-access-stratum differences on a set of study variables related to household production and income. The magnitude as well as the statistical significance of the observed average differences for the sample households are reported on the basis of the market access stratification - i.e. MS I, MS II and MS III. Other independent variables known to affect Household production and income are introduced as control variables. But their direct relationship with household production and income, ignoring the market access categories is not explored in this study. Similarly, the role of the price-related factors - i.e. more remunerative prices, greater price consistency and price awareness - is studied in

conjunction with market access. The independent analysis of the price variables in determing farm level supply response is beyond the scope of this study.

2.37 The statistical inference of the effects of market : is reported separately for each of the eight sample dist of the study. This methodology of carrying out the anal on a district by district basis, rather than on an aggre level for Rapti and the RCU areas, is adopted for two m reasons. Firstly, the sample design is constructed on basis of separate independent samples for each district because of the expected problems in comparing and ranki market access conditions across districts. Because of wide diversity in physical location and topographical c tions among the sample districts, market access cannot easily measured on an uniform scale that would be appr for all eight districts, nor even within the Rapti and areas.

2.38 There is a corresponding lack of uniformity in ecc conditions which cause differences in household product income. These factors could lead to large and unknown in analyzing the effect of market access in household p tion on the basis of a pooled sample of the households various districts. Moreover, the conclusions about the of market access can be different for the several distr concern. Apart from their diversity, most of them are la enough or distinctive enough to be of separate interest individual basis. The second reason why the analysis is on a district by district level is that it is more compa the limited computing facilities available for the stud of the data entry, editing and the statistical analysis in this study were done on single microcomputer (an Applc at IDS.

2.39 In this study the statistical analysis is performed at two different levels. Initially, the bivariate relationship of household production and other study variables is explored in relation to market access. The principal format is one-way analysis of variance (ANOVA) and contingency tables grouped on the basis of market access stratum. In some cases separate tables are prepared for sub-sets of a district sample defined on specific control categories. The statistical significance of the observed differences in group means or categorical frequencies is indicated by summary statistics of tests of hypotheses wherever it is relevant. In the analysis of variance tables the reported F-ratios are computed on the assumption of a fixed effect model. When three market access strata are defined for a particular district, additional statistical inference is drawn from a priori contrasts of the group means through a pairwise comparison of two strata at a time.

2.40 The second level of analysis is in the form of multivariate regressions of household production on market access characteristics and a set of other control variables. In these regressions the market access strata distinctions are indicated through dummy variables. In contrast to the one-way ANOVA and cross tabulations, the multiple regressions provide a more meaningful test of the effects of market access by explicitly accounting for the effect of several other independent control variables. But if the results of the multiple regression analysis conflict with the simpler bivariate analysis, it should not be taken for granted that the former always overrules the latter.[17/]

17/ Our analysis was done on a mini-computer utilizing the limited SPS statistical package. Many of the usual and unusual problems of multiple regressions - e.g. multicollinearity, choice of functional form, inference from residual analysis, the slope effects of dummy variables - are not explored in detail

(ii) Statistical inference in the aggregate

2.41 Apart from the market access strata comparisons within each district, two other levels of inference are possible when the stratum sub-samples are aggregated. Firstly, one can aggregate over the market access strata within a district to provide an estimate of a district level average for specific variables of interest. Secondly one can aggregate over the districts on any particular market access stratum. For instance, the average value of household production of all stratum I households in Rapti can be estimated and compared to the corresponding average in stratum II and III. One could then draw further inferences on the effects of market access at this level of aggregation. Aggregate data at both of these levels are reported in several tables in the subsequent chapters. But it must be clearly stated that the sampling design adopted for the survey does not generally support statistical tests of significance at these aggregate levels.

2.42 Analysis at the first level of aggregation (comparison of district level averages) is not statistically valid because the selected samples are not a random representation of the entire household population of a district. Firstly, landless and submarginal households have not been included in these samples. Secondly, the sample for a particular market access stratum is drawn independently of the total population of the households which can be placed in this particular class of market access. In particular, we have oversampled (in relation to the relative size of the population base in the district) from areas with the best market access (stratum I) so that the effects of market access could

be established with greater precision. For example, the 40 households from Tulsipur and 68 from Ghorahi which comprise stratum I in Dang represent 40% of the entire Dang sample. Any sample with such a high "urban" bias can hardly be taken as representative of Dang district as a whole.

2.43 The second type of aggregation (over districts on a particular market access stratum) presents problems from a different perspective. What is it that the sum of the stratum I sample household in Rapti represents? It consists of 108 households from Dang, 53 from Salyan (all from Khalanga) and 59 from Pyuthan (all Bijuwar). To claim that this sample represents the best market access areas within Rapti district requires two pre-conditions: (1) that the market access characteristics of the sample sites in the different districts be comparable; and (2) that the respective sample size reflects the appropriate population size of the households in each district who have such a market access. Both of these claims can be supported only on a limited basis.

2.44 The adjustments of market access strata (e.g. dropping Liwang and Musikot of Rolpa and Rukum to stratum II)[18] were done mainly to facilitate the comparability of stratum sites across districts. On the second issue, the total sample size for a district was chosen in consideration of the total household population. So some degree of proportionality to size occurs in the respective stratum sub-sample also. But such an indirect consequence is hardly precise enough to claim representativeness of the relevant stratum population.

18/ c.f. Appendix A, part B.

2.45 More seriously, the continuing ambiguity in the interpretation of an absolute level of market access and the resulting ad hoc manner in which the sample sites had to be selected seriously curtail the precision of the statistical inference to be drawn from aggregate comparisons. These comparisons are noted at times in the subsequent chapters for the purpose of completeness; but they should be treated cautiously.

(iii) Reporting of statistical inference in the Tables

2.46 Statistical inference in the Tables reported in this study consists solely of tests for differences among and between market access strata within a district. No tests are performed on district level average characteristics nor for differences between RCUP and Rapti. Two types of statistical tests of inter-stratum differences are reported, depending on the type of variable analyzed.

1. A Chi-square test for the distribution of categorical or non-parametric variables (e.g. the number of households reporting farm product sales).

2. A F-test (and t-test) for differences in the mean value of a parametric variable (e.g. rupee value of sales).

2.47 The Chi-square statistic reported in the tables tests for a statistically significant association between market access strata and the relevant categories or groups of the non-parametric variable. When the null hypothesis of no association is rejected at the indicated degrees of freedom (DF), the Chi-square value is starred (*). That is, a starred value of the Chi-square statistic indicates that market access significantly affects the relevant variable.

It does not, however, give the direction of association between market access strata and the concerned variable. This has to be inferred by actually comparing the reported distribution on market stratum.

2.48 For parametric variables, the reported F-statistic provides a test of the hypothesis that each of the stratum means are statistically not different. When the hypothesis is rejected - i.e. when significant differences in the strata means occur - the F-value is starred. Additional inference about the differences between two stratum means can be made on the basis of a t-test. A different t-test is required to test for the significant differences between any particular pair of stratum means, while the F-statistic tests for equality of all three stratum means.[19/]

2.49 When three market access strata are defined, three separate pairwise hypothesis can be tested. These are

a. MS I mean = MS III mean
b. MS II mean = MS III mean
c. MS I mean = MS II mean

The following convention is used in all tables to indicate statistical inference on the above tests:

i. when (a) is rejected, the appropriate MS III mean is starred (*).

ii. when (b) is rejected, the appropriate MS III mean has a "plus" (+) suffix.

iii. when (c) is rejected, the appropriate MS II mean is starred (*).

19/ When only two market access strata are defined - as in Rukum and Rolpa - obviously, the F and t tests are equivalent and provide the same inference.

Thus when both (a) and (b) are rejected, the MS III mean has a star and a plus suffix.

2.50 Unless otherwise stated, the level of significance (alpha level) for all statistical tests (Chi-square, F and t) are at the 5% level - i.e. 95% confidence level. For the pairwise t-tests, the hypothesis of equal stratum means is formulated as a one-tailed test because a uni-directional relation between favourable market access on the concerned variable can be formulated. For example, the hypothesis of equal average income in MS I and MS III can be tested against the alternative that income is higher in MS I than in MS III (in contrast to the alternative hypothesis that income in MS I is merely not equal to income in MS III, which implies a two-tailed test).

CHAPTER - III

CHARACTERISTICS OF SAMPLES HOUSEHOLDS

A. SOCIO-ECONOMIC CONTROL VARIABLES

(i) Land ownership and cultivation pattern

3.1 Table 3.1 below reports the distribution of land ownership and cultivation of the sample households by district and market strata. The average size of holding by district is not comparable to the Baseline data because landless households and small land-owners have been purposely excluded from this sample. The relative position of each district, however, can be compared to the Baseline data; and on this account the ranking is the same. In Rapti, as expected, Dang has the highest average size of cultivated holding (53 ropani) followed by Salyan (17.2), Rukum (11.8), Rolpa (10.9), and Pyuthan (10.8). In the RCU areas, average land cultivated is highest in Gorkha (17.17 ropani) and smallest in Mustang (11.0).[1/]

3.2 The average size of land owned and cultivated in each market access stratum is also given in Table 3.1. This distribution generally supports the presumption that the size of land holding would not be significantly related to market access because a random sample of households were taken from the panchayats selected for each market stratum. Only in two of the eight districts is there a statistically significant difference among the strata means for land cultivation (indicated by a significant F-value). They are Dang

1/ One hectare is approximately equal to 19.6 ropani. The corresponding average size of land cultivation estimated in the Baseline is 35.2 ropani in Dang, 6.1 in Salyan, 5.9 in Rukum, 5.3 in Rolpa, 3.5 in Pyuthan, 19.6 in Gorkha and 11.4 in the upper Kaligandaki catchment. See Table 1.2 in Chapter I of this report. Except for Mustang and Gorkha, the Baseline estimates are lower which is consistent with the exclusion of very small farmers from the sample for this study. The land size reported in Table 3.1 for Mustang excludes land given to orchards.

and Mustang. In both cases only one stratum mean (MS III in Dang and MS II in Mustang) is significantly different than the other two. In all other cases, the observed differences can be attributed to normal sampling variance.

3.3 The significantly higher average size of land cultivation in stratum II in Mustang (16.8 ropani in comparison to 8.2 and 10 ropani in stratum I and III respectively) and the lower average size in stratum III in Dang (36.8 ropani in comparison to 62.3 and 65.5 ropani in the other two strata) must be borne in mind while interpreting differences in household income and production. In Mustang the effect of this problem of varying average land size is not very critical. The differences in production and income induced by market access are expected to be more extreme between stratum I and III; and in these two strata the average land size is comparable. But in Dang, unfortunately, land size is the smallest in stratum III where production is also expected to be the smallest due to market access effects. So greater caution is required in interpreting the data from Dang even though a bias of this nature can be partly remedied by analysing the variation in production or income per land unit.

3.4 Finally, Table 3.1 also reveals that, except for Dang, there are only minor differences in the average size of land owned and land operated. It implies that the incidence of tenancy is limited and/or the average amounts of land leased in or leased out are small. Tenancy is also an important control variable since it directly affects the distribution of household income through rental payments. Tenancy may also directly affect household production decisions and

TABLE 3.1

SIZE OF LAND CULTIVATED AND OWNED

(in Ropani)[a]

Districts	Land Type	Market Strata I	II	III	Average[b]	F.Value
Dang	Cultivated	62.3	65.1	36.8*+	53.0	7.5*
	Owned	54.4	54.6	31.0*+	45.5	3.7*
Salyan	Cultivated	21.0	17.6	14.0	17.2	n.s
	Owned	20.2	18.6	15.6	17.9	,,
Pyuthan	Cultivated	11.37	9.8	11.2	10.8	,,
	Owned	10.6	10.2	14.0	11.8	,,
Rolpa	Cultivated	-	9.9	11.8	10.9	,,
	Owned		9.7	11.7	10.7	,,
Rukum	Cultivated	-	10.3	12.6	11.8	,,
	Owned		10.8	11.9	11.5	,,
Gorkha	Cultivated	14.9	19.5	16.1	17.2	,,
	Owned	16.2	21.0	16.9	18.2	,,
Myagdi	Cultivated	14.1	10.9	12.6	12.4	,,
	Owned	13.9	10.5	13.9	12.4	,,
Mustang	Cultivated	8.2	16.7	9.9+	1[illegible].0	13.2*
	Owned	8.8	17.7*	9.48+	11.2	6.34*

a/ 1 ropani = 0.051 hectare or 1 hectare = 19.6 ropani

b/ The average land size reported here is not to be compared with the district-wise average reported in the Baseline Survey or other sources because the sample for this study has purposively excluded households with very small land size cultivation. See Chapter II, paragraph

n.s. = not significant at the 95% confidence level.

outcomes of the cultivating household. It is often postulated that tenants who have to give up a certain portion of the output as rent (i.e. under share cropping contracts) will not have the incentive to cultivate land as intensively (-i.e. use smaller amounts of factor inputs per land unit) than owner cultivators. Hence the productivity of land under share cropping is postulated to be lower. Such an assertion has not been tested empirically within the Nepalese context, but there is some evidence for it from northern India which can be borrowed.[2/]

3.5 The effect of tenancy must be kept in mind in interpreting the results from Dang district. Tenancy is widely prevalent; but fortunately its incidence is not related to the choice of market access strata. The proportion of households reporting leased in land are 53% in MS I; 54% in MS II and 41% in MS III. If one looks, however, at the class of pure tenants (no land owned) then the distribution is quite different. 30% and 22% of households in MS I and II of Dang are pure tenants; but in MS III the proportion is much smaller - only 4%. On both accounts the distribution of tenancy is favourable to our research design because if households in MS III of Dang have lower production it cannot be attributed to a higher incidence of tenancy.

(ii) Ethnic distribution

3.6 In Rapti and the RCU areas, as in rural Nepal in general, ethnicity is primarily influenced by place of residence. Even within a particular panchayat, the distribution of ethnic groups is not usually uniform. The sampling clusters in this

2/ cf. Bell (1979).

survey were specified at the ward level of a particular panchayat. Within this population base, it is most probable that one or two ethnic groups will be predominantly represented. Since the collection of only two or three wards make up the sample for a market access stratum, very widely divergent ethnic distributions are possible. By itself this is not usually a critical problem because we are not concerned with estimating the average characteristics of various ethnic groups in a district; but only with treating ethnicity as a relevant control variable in analyzing household production and income differences. Even for this latter purpose problems do occur because of the considerable ambiguity about the manner in which ethnicity is expected to directly affect household production and income.

3.7 Firstly, a very large number of ethnic groups can be distinguished but this wide diversity is not really of much economic importance. One needs to ask what are the relevant categories - in terms of the expected effect on production - on which basis a smaller set of groups can be identified. In the agrarian context of Nepal, ethnicity usually serves as a proxy for other more immediate control variables - e.g. education, land ownership, cultivation technology and a whole set of factors, including market access, which are location-specific. When these factors themselves are identified as control variables, it is difficult to formulate clear hypotheses about the residual independent effect of ethnicity. In the case of crop cultivation ethnic effects are probably minimal. It will play a more important role in determining sources of non-farm income because occupational status and income-generating opportunities will be linked to

ethnicity. But again, differences in the sources of income do not necessarily mean higher or lower income according to ethnicity.

3.8 For this study, as an initial classification, four different ethnic groups are identified whose distinction is taken to be valid for all eight districts. These are: (a) Brahmin/Thakuri/Chhetri (BTC); (b) Magar; (c) Newar; and (d) the (untouchable) professional castes (PC) - e.g. Sarki, Kami etc. Group (a) usually represents the rural elites who control relatively more assets and are more prosperous. This group also interacts more closely with local administrative and political institutions and has greater access to publicly provided resources and services. At the lower end of the hierarchy are the professional castes. They are poor in terms of land ownership - land cultivation may not even be the principal source of income - and usually not integrated with the local development nexus. Magars (and the matwali castes) are also identified separately because they are generally disadvantaged but are primarily land cultivators. Finally Newars are also separated because of the expected differences in occupational status and sources of income other than ownfarm cultivation. In addition to these four, several individual ethnic groups are either very numerous or economically important in particular districts: these are Tharus in Dang; Thakalis in Mustang and Myagdi, Bhotias in Mustang, and Gurungs in (upper) Gorkha.

3.9 The strata-wise distribution of these several groups are reported separately for Dang, the Hill district of Rapti and the RCU areas in Table 3.2, 3.3 and 3.4. Ethnic uniformity across market access strata has not been achieved by our

sampling framework. In fact, the chi-square statistic for each of the eight districts is significant indicating a non-random statistical association between market stratum and ethnicity. In most cases the difference in ethnic distribution is most extreme for numerically small ethnic group samples. For instance in Dang, there are no Newar households in MS III while six households occur in MS I. No Magar households occur in MS II. But in comparison to the overall sample, both Newars and Magars represent small fractions (2.6%) and (3.7%) respectively. The major groups - Tharus and Brahmin/Thakuri/Chhetri - are adequately represented in each stratum and the inter-stratum percentage differences are usually smaller. Consequently, the resulting bias from a non-uniform distribution of ethnic groups among strata is likely to be less critical.

TABLE 3.2

SAMPLE ETHNIC GROUP DISTRIBUTION: DANG

Market Strata	B/T/C[a]	Tharu	Newar	Magar	PC[b]	Others	TOTAL
I	32 (29.6)	68 (62.9)	6 (5.6)	1 (0.9)	1 (0.9)	0 (-)	108
II	14 (23.7)	43 (72.9)	1 (1.7)	0 (-)	1 (1.7)	0 (-)	59
III	34 (32.7)	43 (41.3)	0 (-)	9 (8.7)	8 (7.7)	10 (9.6)	104
TOTAL	80 (29.5)	154 (56.8)	7 (2.6)	10 (3.7)	10 (3.7)	10 (3.7)	271

Figures in the parenthesis are percentages in terms of the sample households in each stratum (row percentage).

a/ Brahmin/Thakuri/Chhetri (the high caste group)

b/ Professional caste groups - Sarki, Kami, Damai, etc.

TABLE 3.3

SAMPLE ETHNIC GROUP DISTRIBUTION: RAPTI HILL DISTRICT

District	Market Strata	B/T/C[a]	Newar	Magar	PC[b]	Others	TOTAL
Salyan	I	33 (62.2)	14 (26.4)	0 (-)	3 (5.7)	3 (5.7)	53
	II	58 (84.1)	0 (-)	5 (7.2)	4 (5.6)	2 (2.9)	69
	III	53 (71.6)	0 (-)	4 (5.4)	17 (22.9)	0 (-)	74
	TOTAL	144 (73.5)	14 (7.1)	9 (4.6)	24 (12.2)	5 (2.6)	196
Pyuthan	I	17 (28.8)	6 (10.2)	4 (6.8)	29 (49.2)	3 (5.0)	59
	II	18 (31.6)	24 (42.1)	5 (8.8)	7 (12.2)	3 (5.3)	57
	III	53 (71.6)	0 (-)	3 (4.1)	11 (14.9)	7 (9.4)	74
	TOTAL	88 (46.3)	30 (15.8)	12 (6.3)	47 (24.7)	13	190
Rolpa	II	38 (39.2)	1 (1.0)	38 (39.2)	8 (8.2)	12 (12.4)	97
	III	16 (15.8)	0 (-)	67 (66.3)	15 (14.9)	3 (2.9)	101
	TOTAL	54 (27.3)	1 (0.5)	105 (53.0)	23 (11.6)	15 (7.6)	198
Rukum	II	48 (90.6)	2 (3.8)	0 (-)	3 (5.6)	0 (-)	53
	III	77 (81.1)	0 (-)	7 (7.4)	8 (8.4)	3 (3.1)	95
	TOTAL	125 (84.5)	2 (1.4)	7 (4.7)	11 (7.4)	3 (2.0)	148

Figures in the parenthesis are percentages in terms of the sample households in each stratum (row percentage).

a/ and b/ as in Table 3.2

3.10 In the Rapti Hill districts, a major irregularity occurs only in the case of Pyuthan. 49% of the households in MS I (Bijuwar) are of the (untouchable) professional castes, while the corresponding proportions are only 12% and 15% in the other two strata. This high proportion in MS I definitely represents oversampling of this group. (It is the result of a sampling design that pre-selects wards and then households from within the ward population). There is also a relatively much higher percentage of Newar households in MS II and of Brahmin/Thakuri/Chhetri households in MS III. The average levels of household production and income of these two groups are expected to be higher than those of the PC group. The effect of this sampling bias is to understimate the likely differences in income and production attributable to market access in the case of Pyuthan district.

3.11 Similar irregularities occur in the RCU districts. But here the sample distribution is more clearly related to differences in ethnic distribution of the population itself. Stratum III in Mustang is identified as the areas north of Jomsom. It is an area inhabited primarily by the Bhotia group. Our sample of this zone turns out to be exclusively of this group. In the case of Gorkha also, stratum III is the northern panchayats (Barpak, Swanra, Jaubari) where Gurungs predominante; but they are not usually found in the southern panchayats. Consequently, 60% of the MS III households are Gurung, but the corresponding proportion is only 1% and 5% in the other two strata.

TABLE 3.4

SAMPLE ETHNIC GROUP DISTRIBUTION: RCU AREAS

District	Market Strata	B/T/C a/	Newar	Magar	Gurung Thakali c/	PC b/	Bhotia d/ Others	Total
Gorkha	I	38 (52.7)	18 (25.0)	3 (4.2)	1 (1.4)	9 (12.5)	3 (4.3)	72
	II	35 (33.7)	17 (16.3)	27 (25.9)	5 (4.8)	9 (8.7)	11 (10.6)	104
	III	10 (13.2)	6 (7.9)	0 (-)	46 (60.5)	11 (14.5)	3 (3.9)	76
	Total	83 (32.9)	41 (16.3)	30 (11.9)	52 (20.6)	29 (11.5)	17 (6.7)	252
Myagdi	I	37 (75.5)	0 (-)	0 (-)	1 (2.0)	11 (22.4)	0 (-)	49
	II	21 (29.2)	5 (6.9)	23 (31.9)	9 (12.5)	12 (16.7)	2 (2.8)	72
	III	2 (2.9)	0 (-)	40 (57.1)	4 (5.7)	12 (17.1)	12 (17.1)	70
	Total	60 (31.4)	5 (2.6)	63 (33.0)	14 (7.3)	35 (18.3)	14 (7.3)	191
Mustang	I	0 (-)	0 (-)	0 (-)	57 (91.9)	2 (3.2)	3 (4.8)	62
	II	1 (2.6)	0 (-)	4 (10.3)	29 (74.3)	5 (12.8)	0 (-)	39
	III	0 (-)	0 (-)	0 (-)	0 (-)	0 (-)	59 (100)	59
	Total	1 (0.6)	0 (-)	4 (2.5)	86 (53.8)	7 (4.3)	62 (38.8)	160

a/ and b/ as in Table 3.2

c/ This represents Gurung in Gorkha and Thakali in Myagdi and Mustang

d/ This represents Others in Gorkha and Myagdi and Bhotia in Mustang

(iii) Family size

3.12 The average family size for each district and the relative frequency in terms of specific size classes are indicated in Table 3.5. Family size refers to related persons sharing the same kitchen. It does not include servants or permanent farm workers employed by the household. As expected, the largest family size (8.75 members) occurs in Dang. Tharus are known to have large families. Salyan and Pyuthan are next in Rapti zone with an average size of more than 7 members, followed by Rukum and Rolpa. In the RCU areas, the average of approximately 5 members which occurs both in Mustang and Myagdi is significantly lower than the 7 plus size in Gorkha. Except Dang, in all districts the most frequent household size class is the 3 to 6 members.

3.13 The comparison with the average household size of the Baseline Survey presents some difficulties. This household size was defined to include servants and other non-family members; so by definition, it must be larger than or equal to average family size. This expected relation, however, occurs in Rolpa and in Mustang and Myagdi. In the other cases, the current sample estimates of family size exceed the Baseline estimate of household size.

3.14 Since family size is known to be a stable demographic variable, such unexpected differences could not normally be attributed to random sampling variance. In the present case, one possible explanation lies in the sampling procedures adopted for the current survey. As noted in Chapter II, landless households and submarginal farmers were purposely not selected for this survey. So the average size of land

TABLE 3.5

DISTRIBUTION OF FAMILYSIZE BY DISTRICT: RAPTI AND RCU

Districts	Number of Households with Family Size						Average Family Size	Base line household size a/
	1-3	4-7	7-9	10-12	13-20	20+		
Dang	8 (2.9)	65 (24.0)	107 (39.5)	51 (18.8)	36 (13.3)	4 (1.5)	8.75	8.15
Salyan	16 (8.1)	84 (42.9)	56 (28.6)	26 (13.3)	11 (5.6)	3 (1.5)	7.18	6.33
Pyuthan	19 (10.0)	74 (38.9)	56 (29.5)	20 (10.5)	21 (11.1)	0 (-)	7.26	6.12
Rolpa	28 (14.1)	99 (50.0)	49 (24.7)	12 (6.1)	10 (5.1)	0 (-)	6.11	6.27
Rukum	6 (4.1)	83 (56.1)	47 (31.7)	8 (5.4)	3 (2.0)	1 (0.7)	6.43	5.34
Rapti Total	77 (7.7)	405 (40.3)	315 (31.4)	117 (11.7)	81 (8.1)	8 (0.8)	7.29	6.59
Gorkha	20 (7.9)	109 (43.3)	84 (33.3)	25 (9.9)	12 (4.8)	2 (0.8)	7.07	6.43
Myagdi	32 (16.8)	117 (61.3)	34 (17.8)	4 (2.0)	4 (2.0)	0 (-)	5.26	5.36
Mustang	36 (22.5)	79 (49.3)	40 (25)	4 (2.5)	1 (0.6)	0 (-)	5.36	5.36
RCU Total	88 (14.6)	305 (50.6)	158 (26.2)	33 (5.5)	17 (2.8)	2 (0.3)	6.04	n.r.

a/ Rapti Baseline Survey Table 2.1.4 pg. 28 and
RCU Baseline Survey Table 2.1.2 pg. 36.

n.r. = not reported

cultivated per household reported in Table 3.1 is usually substantially higher than the Baseline estimates of land cultivated (Table 1.2) except in Mustang and Gorkha. In traditional agriculture it is often observed that landless households have a smaller family size than landed ones; and furthermore, that family size is positively correlated with land size even among landed households.[3/] So it is likely that the smaller household size (and hence, the smaller family size) reported in the Baseline survey reflects the proportional weight of the smaller family size of the landless and sub-marginal households who are excluded from the sample for the present study.

(iv) Educational status of household head

3.15 Education is taken to be an important determinant of household production and income even among farming families in traditional agriculture. The positive correlation between household production and the level of education of the household head has been documented in Nepalese farming conditions also.[4/] Some problems, however, occur in defining and quantifying educational levels. Because access to formal education is very limited, a variable such as years of schooling is not really a good representation of educational status. It is also important to distinguish those who may not have any formal schooling but are still functionally literate.

3/ See A Search for linkages: Family Size, Farm size and Agricultural Inputs in Nepal (A report submitted to the National Population Commission, 1982).

4/ c.f Pudasaini (1981)

3.16 The following four categories of educational status have been adopted: (1) illiterate, (2) literate, and if has formal schooling, not passed class 8, (3) class 9 to Intermediate level (2 years) of college; and (4) passed Intermediate or higher. Educational status is expected to be strongly influenced by the local presence of educational institutions. Such location specific effects are, therefore, likely to be correlated within the definition of market access strata adopted for the study. This is indeed borne out by Tables 3.6 and 3.7.

3.17 Higher-secondary and college levels of education are very negligible. But where it occurs it is very clearly correlated to the market strata classes identified for the study. In the entire sample only 93 out of 1606 household heads (less than 6 percent) have had any formal education above class 8. It exceeds 10% only in the case of Pyuthan and is the lowest in the case of Rolpa (1.5%). Pooling all these households (since the numbers involved are small) more than 50% of the 93 households are in stratum I and only 9 — i.e. less than 10% - are in stratum III. In relation to the total number of MS III households, it represents a negligible 1.4 percent.

3.18 Tables 3.6 and 3.7 indicate that even the distribution of literate vs. illiterate households is strongly related to market access. In all eight districts more than 50% of the households in MS III are illiterate. The highest proportions are in Myagdi (77%) and Mustang (72%). The proportion of illiterate households is always higher in MS III than in MS I (than MS II in Rolpa and Rukum). The overall degree of association between market access strata and educational

TABLE 3.6

EDUCATION STATUS BY STRATA: RAPTI

Districts	Market Strata	Illiterate	Literate[a]	Higher Secondary[b]	Intermediate and above[c]	Chi-Square Statistic
Dang	I	52 (48.6)	38 (35.5)	11 (10.3)	6 (5.6)	
	II	42 (71.2)	9 (15.2)	3 (5.1)	5 (8.5)	29.13**
	III	63 (60.6)	41 (39.4)	0 (-)	0 (-)	DF = 6
	Total	157(58.1)	88 (32.6)	14 (5.2)	11 (4.1)	
Salyan	I	22 (41.5)	26 (49.1)	4 (7.5)	1 (1.9)	
	II	48 (69.6)	20 (29.0)	1 (1.4)	0 (-)	13.24*
	III	38 (52.7)	32 (43.2)	3 (4.0)	0 (-)	DF = 6
	Total	109(55.6)	78(39.8)	8 (4.1)	1 (0.5)	
Pyuthan	I	25 (42.4)	25 (42.4)	6 (10.1)	3 (5.1)	
	II	24 (42.1)	24 (42.1)	9 (15.8)	0 (-)	13.93*
	III	38 (51.3)	34 (45.9)	2 (2.7)	0 (-)	DF = 6
	Total	87 (45.8)	83 (43.7)	17 (8.9)	3 (1.6)	
Rolpa	II	65 (67.0)	31 (32.0)	1 (1.0)	0 (-)	n.s.
	III	70 (69.3)	29 (28.7)	2 (2.0)	0 (-)	
	Total	135(68.2)	60 (30.3)	3 (1.5)	0 (-)	
Rukum	II	28 (52.8)	22 (41.5)	3 (5.7)	0 (-)	n.s.
	III	64 (67.4)	30 (31.6)	1 (1.0)	0 (-)	
	Total	92 (62.2)	52 (35.1)	4 (2.7)	0 (-)	
Rapti Total	I	99 (45.2)	89 (40.6)	21 (9.6)	10 (4.6)	
	II	207 (61.8)	106 (31.6)	17 (5.1)	5 (1.5)	51.26*
	III	274 (61.2)	166 (37.1)	8 (1.7)	0 (-)	DF = 6
	Total	580 (57.9)	361 (36.0)	46 (4.6)	15 (1.5)	

Figures in the parenthesis indicate respective percentage of stratum households.

a/ functionally literate or formal schooling less than class 8

b/ class eight upto 2nd year in intermediate college,

c/ passed I.A. and above

TABLE 3.7

EDUCATION STATUS BY STRATA: RCU

Districts	Market Strata	Illiterate	Literate a/	Higher Secondary b/	Intermediate and above c/	Chi-Squ Statist
Gorkha	I	30 (44.8)	29 (43.3)	7 (10.4)	1 (1.5)	13.04
	II	49 (48.5)	48 (47.5)	4 (4.0)	0 (-)	DF =
	III	44 (57.9)	32 (42.1)	0 (-)	0 (-)	
	Total	123 (50.4)	109 (44.7)	11 (4.5)	1 (0.4)	
Myagdi	I	29 (60.4)	16 (33.3)	1 (2.1)	2 (4.2)	
	II	39 (55.7)	26 (37.1)	4 (5.7)	1 (1.4)	n.s.
	III	40 (76.9)	12 (23.1)	0 (-)	0 (-)	
	Total	108 (63.5)	54 (31.8)	5 (2.9)	3 (1.8)	
Mustang	I	25 (40.3)	32 (51.6)	4 (6.4)	1 (1.6)	
	II	15 (38.5)	18 (46.2)	5 (12.8)	1 (2.5)	19.46*
	III	43 (72.9)	15 (25.4)	1 (1.7)	0 (-)	DF = 6
	Total	83 (51.9)	65 (40.6)	10 (6.2)	2 (1.3)	
RCU Total	I	84 (47.5)	77 (43.5)	12 (6.8)	4 (2.2)	
	II	103 (49.0)	92 (43.8)	13 (6.2)	2 (0.9)	
	III	127 (67.9)	59 (31.6)	1 (0.5)	0 (-)	
	Total	314 (54.7)	228 (39.7)	26 (4.5)	6 (1.0)	

Figures in the parenthesis indicate respective percentage of stratum households.

a/, b/, c/: as in Table 3.6

status (as measured by the Chi-square statistic) is statistically significant in five of the eight districts — Dang, Salyan, Pyuthan, Mustang and Gorkha. The general level of educational status is limited in the remaining three districts; and so it does not differ greatly by stratum.

B. MARKET ACCESS CHARACTERISTICS

3.19 It is necessary to evaluate in detail the actual differences in market access characteristics that have been captured by our sampling design based on pre-defined market access strata. Needless to say, the validity of the subsequent analysis depends entirely on observing the expected differences in market access related variables among the market access strata defined for each district. Chapter II referred to some of the problems in defining and measuring market access in Rapti and RCU areas on the basis of a priori information. The information gathered in the sample survey helps resolve only some of these ambiguities. The major difficulty - i.e. lack of information on the volume of sales or total effective demand at a particular market or location — remains because the survey was not designed to collect this information. It was not feasible to incorporate such estimates given the limited time and extensive coverage of the sample survey. The validity of the market access strata used in the study can be checked, however, on the basis of the following market access characteristics for which information was collected:

(i) location of a market closest to the sample site

(ii) the proportion of sample households who report sales of farm products

(iii) the average distance to point of sales for those households reporting sales in a market place

(iv) average producer prices

(v) price awareness of households.

(i) Market location

3.20 The presence of a local market within the sampled ward and/or within one day's walk from the sample site is indicated in Tables 3.8 and 3.9. Markets in this context refer to permanent retail establishment (no matter how small or few in number) that sell food products and other items of basic household consumption. The information on this basis is clearly supportive of the market strata classification adopted in the study. In Rapti, all four sample sites in MS I report a market within the sampled ward; whereas none of the sites in MS III (17 separate locations) have such a market. 10 of these 17 sample sites report a market within one day's walk. Of the remaining 7 MS III sites with no local market, 3 are in Rolpa, 2 in Salyan and one each in Rukum and Pyuthan. In stratum II, a market within the ward exists in both sites in Pyuthan, and in one out of two sites in Dang, Rukum and Rolpa. But in all cases there is a market at least within a day's walk.

3.21 A similar pattern is observed for the RCU sample sites. 4 out of 6 MS I sites report a market within the ward but in MS III the corresponding proportion is only 4 out of 9. In all, 22 of the 24 sites have a market within a day's walk. The two exceptions are in Myagdi and Gorkha both of which occur in stratum III. Compared to Rapti, RCU is better served by local markets. The proportion with a market within

TABLE 3.8

VILLAGE MARKET IN WARD AND WITHIN A DAY'S WALK

RAPTI

Districts	Market Strata	Number of Sample Villages	Market in Ward		Market: Day's Walk	
			Yes	No	Yes	No
Dang	I	2	2	0	2	0
	II	2	1	1	2	0
	III	3	0	3	3	0
Salyan	I	1	1	0	1	0
	II	2	0	2	2	0
	III	3	0	3	1	2
Pyuthan	I	1	1	0	1	0
	II	2	2	0	2	0
	III	3	0	3	2	1
Rolpa	II	2	1	1	2	0
	III	4	0	4	1	3
Rukum	II	2	1	1	2	0
	III	4	0	4	3	1
Rapti	I	4	4	0	4	0
	II	10	5	5	10	0
	III	17	0	17	10	7
	Total	31	9	22	24	7
			RCU			
Gorkha	I	2	1	1	2	0
	II	4	1	3	4	0
	III	3	2	1	2	1
Myagdi	I	2	1	1	2	0
	II	3	1	2	3	0
	III	3	0	3	2	1
Mustang	I	2	2	0	2	0
	II	2	0	2	2	0
	III	3	2	1	3	0
RCU	I	6	4	2	6	0
	II	9	2	7	9	0
	III	9	4	5	7	2
	Total	24	10	14	22	2

the ward is 29% (9 of 31) in Rapti and 42% (10 of 24) in RCU. The proportion with a market within a day's walk are 77% and 91% respectively. As a consequence of this higher proportion, the strata differences in RCU are less sharp than in Rapti.

(ii) Type of sales

3.22 Village level information on the most common method of surplus crop disposal and the mode of transportation used by the sample households was also collected. On this account there is hardly any diversity. All sample sites in the RCU areas and in Rolpa, Rukum and Pyuthan of Rapti zone report that sales locally to neighbours is the usual form of market participation. In Salyan, only one site in stratum II reports sales in the local market place while the other five report sales to neighbours. In Dang, both sample wards in MS I and 1 of 2 in MS II report sales in a market place. An even greater degree of uniformity is reported for the usual mode of transportation. Self portering is the most common method except for Mustang, where animal carriage is reported in all sample sites.

(iii) Market participation

3.23 Though the sampled sites seem well served by local retail outlets, actual market participation of households in the form of sales or exchanges is very limited, except for Dang. Household information was collected separately on sales of livestock products and animals, fruits and vegetables, and on sales or barter exchanges of crops (including potatoes).

3.24 The incidence of barter exchanges is extremely limited with the exception of Rukum which is the most remote and poorest district of Rapti zone. None of the sample households in Pyuthan (which includes sample sites from the northern portion of the district) and Mustang reported any barter transactions. The distribution of barter transactions by district and market access stratum is reported in Table 3.9. Two separate indicators are noted: (i) the number of households with any barter exchanges; and (ii) the subset of (i) who have <u>only</u> barter exchanges - i.e. no monetary sale transactions are reported by these households.

3.25 A grand total of 38 households in the entire sample of 1600 households - i.e. less than 3 percent - report some barter transactions. 30 of these cases are in Rapti of which 22 occur in Rukum, split evenly between MS II and MS III. The barter cases in Rukum represent about 15% of the total district sample size. When expressed as a percentage of the stratum sample size, the incidence of barter is slightly higher in MS II (20.7%) in comparison to MS III (13.5%) of Rukum.

3.26 There are very few cases where barter exchanges are mixed with monetary transactions: 30 of the total 39 households are pure barterers - i.e. all output transactions are barter exchanges only. Again, most of these cases are in Rukum. This suggests that once households initiate monetary transactions, the tendency is to mediate all transactions through money. This inference, along with the fact that very few households reported barter transaction in the survey, testifies to the declining incidence of barter transactions.

TABLE 3.9

NUMBER OF HOUSEHOLDS REPORTING BARTER EXCHANGES

Districts	Market Strata	Sample Size	No. With Barter Exchange	No. With Only Barter Exchanges
Dang	I	108	0 (-)	0 (-)
	II	59	0 (-)	0 (-)
	III	104	2 (1.9)	0 (-)
	Total	271	2 (0.7)	0 (-)
Salyan	I	53	0 (-)	0 (-)
	II	69	3 (4.3)	3 (4.3)
	III	74	0 (-)	0 (-)
	Total	196	3 (1.5)	3 (1.5)
Pyuthan		190	No household reported barter exchanges	
Rolpa	II	97	3 (3.1)	2 (2.1)
	III	101	0 (-)	0 (-)
	Total	198	3 (1.5)	2 (1.0)
Rukum	II	53	11 (20.8)	9 (16.9)
	III	95	11 (11.6)	11 (11.6)
	Total	148	22 (14.9)	20 (13.5)
RAPTI TOTAL	I	220	0 (-)	0 (-)
	II	335	17 (5.1)	14 (4.2)
	III	448	13 (2.9)	11 (2.5)
	Total	1003	30 (3.0)	25 (2.5)
Gorkha	I	72	2 (2.8)	1 (1.4)
	II	104	1 (0.9)	1 (0.9)
	III	76	2 (2.6)	1 (1.3)
	Total	252	5 (1.9)	3 (1.2)
Myagdi	I	49	2 (4.1)	0 (-)
	II	72	2 (2.8)	2 (2.8)
	III	70	0 (-)	0 (-)
	Total	191	4 (2.1)	2 (1.0)
Mustang		160	No household reported barter exchanges	
RCU TOTAL	I	183	4 (2.2)	1 (0.5)
	II	215	3 (1.4)	3 (1.4)
	III	205	2 (0.9)	1 (0.5)
	Total	603	9 (1.5)	5 (0.8)

Figures in parenthesis indicate percentages with respect to sample households in each stratum.

TABLE 3.10 A

DISTRIBUTION OF HOUSEHOLDS WITH CROP SALES: RAPTI

Districts	Market Strata	Sample Size	No. with Crop Sale	Sales in a Market	
				No. of cases	Average distance to Market (KM)
1	2	3	4	5	6
Dang	I	108	55 (51.0)	43 (39.8)	2.7
	II	59	40 (68.0)	16 (27.1)	17.6
	III	104	56 (54.0)	38 (36.5)	21.3
	Total	271	151 (55.7)	97 (35.8)	
Salyan	I	53	6 (11.3)	2 (3.8)	8.5
	II	69	6 (8.7)	0 (-)	-
	III	74	4 (5.4)	1 (1.4)	32.0
	Total	196	16 (8.2)	3 (1.5)	
Pyuthan	I	59	4 (6.8)	0 (-)	-
	II	57	3 (5.3)	0 (-)	-
	III	74	10 (13.5)	0 (-)	-
	Total	190	17 (8.9)	0 (-)	
Rolpa	II	97	4 (4.1)	0 (-)	-
	III	101	5 (4.9)	0 (-)	-
	Total	198	9 (4.5)	0 (-)	
Rukum	II	53	13 (24.5)	2 (3.8)	20.5
	III	95	32 (33.6)	10 (10.5)	48.7
	Total	148	45 (30.4)	12 (8.1)	
Rapti TOTAL	I	220	65 (29.5)	45 (20.5)	3.0
	II	335	66 (19.7)	18 (5.4)	17.9
	III	448	107 (23.9)	49 (10.9)	27.1
	Total	1003	238 (23.7)	112 (11.2)	

Figures in the parenthesis indicate percentages in terms of the sample households in each stratum (row percentage)

N.B. The chi-square test of association between market access and the frequency with crop sale (col. 4) shows a significant relation only for the total sample of Rapti and not for any individual district. (The chi-square statistic = 7.12* with 2 degrees of freedom for the Rapti total sample).

TABLE 3.10 A

DISTRIBUTION OF HOUSEHOLDS WITH CROP SALES: RCU

Districts	Market Strata	Sample Size	No. with Crop Sale	Chi-Square	Sales in a Market: No. of cases	Sales in a Market: Average Distance to Market
1	2	3	4	5	6	7
	I	72	15 (20.8)	11.53*	2 (2.8)	1
Gorkha	II	104	25 (24.0)	DF=2	0 (-)	-
	III	76	4 (5.3)		4 (5.3)	6.3
	Total	252	44 (17.5)		6 (2.4)	
	I	49	10 (20.4)		0 (-)	-
Myagdi	II	72	4 (5.6)	9.31*	0 (-)	-
	III	70	4 (5.7)	DF=2	0 (-)	-
	Total	191	18 (9.4)		0 (-)	
	I	52	17 (27.4)		0 (-)	-
Mustang	II	39	17 (43.6)	18.3*	0 (-)	-
	III	59	4 (6.8)	DF=2	0 (-)	-
	Total	160	38 (23.8)		0 (-)	
	I	183	42 (22.9)		2 (1.1)	1
RCU	II	215	46 (21.4)	26.02*	0 (-)	-
Total	III	205	12 (5.8)	DF=2	4 (1.9)	6.3
	Total	603	100 (16.6)		6 (0.9)	

Figure in the parenthesis indicate percentages in terms of the sample households in each stratum (row percentage).

N.B. The reported Chi -square statistic tests for an association between market access and the incidence of crop sales, (col. 4) in the sample households (col. 3).

3.27 The incidence of monetary crop sales (excluding barter exchanges) is reported separately in Tables 3.10 and 3.11. The percentage of households reporting any sale of crops varies from a high 56% in Dang to a low 4.5% in Rolpa. The corresponding percentages for the other districts are Salyan (8.2%), Pyuthan (8.9%), Rukum (30.4%), Gorkha (17.5%), Myagdi (9.4%) and Mustang (23.7%). The relatively higher percentages in Mustang and Gorkha are to be expected but Rukum is a surprise since it is the most remote as well as least developed of the Rapti zone district.[5/]

3.28 One should recall here that the sampling design used in this study does not correctly support such inter-district comparison of an average attribute or variable (See Chapter II; Section C). In addition to the ambiguity of statistical inference at the aggregate district level, it is necessary to point out the possible effect of several other key variables on household crop sales. One of these is definitely the size of land holding. It is also important to distinguish between crop sales of households that are genuinely surplus producers from those that may sell occasionally but in the aggregate are <u>net purchasers</u> of food crops. To account partially for these two factors, the percentage of households with sales among those cultivating more than 10 <u>ropani</u> of land; and, secondly, the percentage with sales among households that are not surplus producers are also reported in Table 3.11. For these categories the percentage of households

5/ The Baseline estimates of average household adjusted income place Rukum fourth in rank in Rapti (above Rolpa). But in terms of average cash income (which is more likely to be related to market access and market participation), Rukum has the lowest average (NPROSC 1980a, pg.102).

with sales are higher than those reported above, but the ranking is mostly the same. Among the large farmers, the highest percentage is still in Dang (57.9%) followed by Rukum (50.9%), Mustang (35.6%), Gorkha (28.4%), Pyuthan (19%), Rolpa (12.1%), and Salyan (10.3%). For the group of surplus producing households, the relative ranking of the proportions with crop sales is as follows; Dang (82.4%), Mustang (51.5%), Rukum (45.9%), Myagdi (40%), Salyan (33.8%), Gorkha (33.7%), Pyuthan (24.9%), and last Rolpa (9.5%).[6]

3.29 Rather than inter-district comparisons, the more important concern is to evaluate whether the market participation proportions are consistent with the classification of market access strata within each district. On this account, the verdict is very mixed. Looking at the proportion of farmers with sales among these cultivating more than 10 ropani (Col. 5), in Table 3.11 a completely consistent relationship - i.e. higher proportion in each strata identified to have better market access - occurs in four districts. These are Salyan and Rolpa in Rapti, and Myagdi and Gorkha in the RCU zone. In Mustang, though MS II has a slightly higher percentage with sales than MS I (42.3% vs. 40%), both are

6/ The relatively small proportions of sales among crop "surplus" households present problems in the interpretation of surplus household. This classification is based on the respondent's own answer to whether enough food was produced on the farm to meet family consumption needs. Some confusion occurs because those households who are just self-sufficient are not distinguished. Nevertheless one would have expected a higher frequency of crop sales for households who claim to be surplus producers than reported in Tables 3.11 A and B. Perhaps respondents were reluctant to reveal their true food deficit conditions during the interview for status considerations.

TABLE 3.11 A

DISTRIBUTION OF HOUSEHOLDS WITH CROP SALES FOR SELECTED CATEGORIES: RAPTI

Districts	Market Strata	Sample Size	Large Farmers[1/] Total No.	Large Farmers[1/] No. with Sales	Grain Surplus Households Total No.	Grain Surplus Households No. with Sales	Chi-Square[2/]
1	2	3	4	5	6	7	8
	I	108	98(90.7)	48(48.9)	37(34.3)	30(81.1)	a)6.6*
Dang	II	59	56(94.4)	39(69.6)	28(47.5)	24(85.7)	df=2
	III	104	86(82.7)	52(60.5)	26(25.0)	21(80.8)	
	Total	271	240(88.6)	139(57.9)	91(33.6)	75(82.4)	
	I	53	32(60.4)	4(12.5)	20(37.7)	16(80.0)	
Salyan	II	69	42(60.9)	5(11.9)	26(37.7)	5(19.2)	
	III	74	43(58.1)	3(6.9)	28(37.8)	4(14.3)	
	Total	196	117(59.7)	12(10.3)	74(37.8)	25(33.8)	
	I	59	14(23.7)	1(7.1)	15(25.4)	2(13.3)	
Pyuthan	II	57	13(22.8)	2(15.4)	14(24.5)	3(21.4)	
	III	74	31(41.9)	8(25.8)	29(39.2)	9(31.0)	
	Total	190	58(30.5)	11(18.9)	58(30.5)	14(24.1)	
	II	97	32(32.9)	4(12.5)	54(55.7)	4(7.4)	
Rolpa	III	101	42(41.6)	5(11.9)	41(40.6)	5(12.2)	
	Total	198	74(37.4)	9(12.2)	95(47.9)	9(9.5)	
	II	53	18(33.9)	9(50.0)	30(56.6)	13(43.3)	
Rukum	III	95	39(41.1)	20(51.3)	68(71.6)	32(47.1)	
	Total	148	57(38.5)	29(50.9)	98(66.2)	45(45.9)	
	I	220	144(65.5)	53(36.8)	72(32.7)	48(66.7)	
Rapti	II	335	161(48.1)	59(36.6)	152(45.4)	49(32.2)	b)23.68*
Total	III	448	241(53.8)	88(36.5)	192(42.9)	71(37.0)	(df =2)
	Total	1003	546(54.4)	200(36.6)	416(41.5)	168(40.4)	

Figures in the parenthesis in colums 4 and 6 indicate the percentage in terms of sample households in each stratum (col.3). The column (5) percentage is with respect to the total in column (4) and the col. (7) percentage is with respect to the total in column (6).

1/ Households cultivating more than 10 ropani of land.

2/ The reported Chi-square statistic represent the following:
a) frequency of large farmer households with crop sales (col.5).
b) frequency of grain surplus households with sales (col.7)

Unreported categories imply that the Chi-Square statistic is not significant.

TABLE 3.11 B

DISTRIBUTION OF HOUSEHOLDS WITH CROP SALES FOR SELECTED CATEGORIES: RCU

Districts	Market Strata	Sample Size	Large Farmers 1/		Grain Surplus HH.		Chi-Square 2/
			Total No.	No. with Sales	Total No.	No. with Sales	
1	2	3	4	5	6	7	8
Gorkha	I	72	33(45.8)	13(39.4)	39(54.2)	13(33.3)	a)10.03*
	II	104	74(71.2)	25(33.8)	63(60.6)	23(39.5)	(df=2)
	III	76	41(53.9)	4(9.8)	19(25.0)	4(21.1)	
	Total	252	148(58.7)	42(28.4)	121(48.0)	40(33.1)	
Myagdi	I	49	24(48.9)	10(41.7)	13(26.5)	9(69.2)	a)8.3*
	II	72	22(30.6)	3(13.6)	17(23.6)	4(23.5)	b)6.97*
	III	70	33(47.1)	4(12.1)	10(14.3)	3(30.0)	(df=2)
	Total	191	79(41.4)	17(21.5)	40(20.9)	16(40.0)	
Mustang	I	62	15(24.2)	6(40.0)	25(40.3)	14(55.0)	
	II	39	26(66.7)	11(42.3)	29(47.4)	16(55.8)	n.s.
	III	59	18(30.5)	4(22.2)	12(20.3)	4(33.3)	
	Total	160	59(36.9)	21(35.6)	66(41.3)	34(51.5)	
RCU	I	183	72(39.3)	29(40.3)	77(42.1)	36(46.8)	a)16.55*
	II	215	122(56.7)	39(31.9)	109(50.7)	43(39.4)	(df=2)
	III	205	92(44.9)	12(13.0)	41(20.0)	11(26.8)	
	Total	603	286(47.4)	80(27.9)	227(37.6)	90(39.6)	

Figures in the parenthesis in column (4) and (6) indicate the percentage in terms of the sample households in each stratum (col. 3). The column (5) percentage is with respect to the total in column (4), and that of col.(7) with respect to the total in col.(6).

1/ and 2/: as in Table 3.11A

substantially higher than the 22.2% of MS III. So this case also offers satisfactory support for our definition and selection of market access sample sites. Rukum is a neutral case because the proportions with sales are approximately equal (about 50%) in both strata. In Dang, the proportion with sales is highest in MS II (69.6%); but the 49% with sales in MS I is considerably less than the 60.5% in MS III, where sales are expected to be more unlikely. The most contrary result occurs, however, in the case of Pyuthan. The proportion of sales is highest in MS III (25.8%), and then in MS II (15.4%) and MS I (7.1%). The same reverse association occurs also in the case of sales among surplus households.[7/] One should, however, note that the proportion of households with crop sales is only a partial indicator of market access. It would be surprising, indeed, if for all districts a systematic decreasing tendency in this proportion was observed in each stratum sub-sample classified as having poorer market access.

3.30 Another proximate basis for assesing market access is distance to the market place for those households reporting such sales. This is not a very powerful test because of the limited number of households who actually sell in a market place (as opposed to sales to neighbours and traders that

7/ Further analysis at the village level for Pyuthan showed that the high proportion of sale in MS III represent the effect of one panchayat: 7 of the 10 households with crop sales occurs in Baraula; as do 6 of the 8 cases among households cultivating ten ropani or more. Setting aside Baraula panchayat, the market participation in Pyuthan becomes more closely related to the interpretation of market access strata. One should also recall that the MS I sample in Pyuthan is not very representative since nearly half of it consists of the professional castes ethnic group.

come to the home). In fact, in four district — Pyuthan, Rolpa, Mustang and Myagdi — no household reports "market" sales. In the remaining four, only Dang has sufficient cases to make statistical comparisons meaningful. Nevertheless, in all these latter four districts the average distance to the market in which crops were actually sold consistently increases from MS I to MS II to MS III, respectively. In Gorkha, the average distance is 1 km. in MS I and 6.25 km. in MS II (no market sales in MS III). In Rukum it is 20.5 km. in MS II vs. 48.7 km. in MS III; and 9.5 km. in MS I of Salyan compared to 32 km. in MS III. In Dang where a total of 97 cases report market sales, the average distance is 2.71 km. in MS I; 17.6 km. in MS II and 21.3 km. in MS III.[8/]

3.31 To complete the information on sales of farm output, Table 3.12 reports the proportion of households with sales of livestock products (including live animals); sales of fruits and vegetables; and sales of any item (i.e. either crops, livestock products or fruits and vegetables). Livestock sales are even less consistently related to market access strata than crop sales. This is to be expected in the cases of Mustang and Rukum because stratum III samples are drawn from areas which concentrate primarily in livestock production (i.e. the northern regions of both districts). Almost 56% of MS III households in Rukum report livestock sales which is significantly higher than the 38% in MS II,

8/ See Tables 3.10 A and 3.10B. These results are statistically significant only in the case of Dang. A F-value of 30.3 with 2/94 degrees of freedom rejects the null hypothesis of equal average distance at the 1% level. On the basis of pairwise comparisons (t-test), the MS I mean is significantly lower than both the MS II and MS III means.

TABLE 3.12 A

DISTRIBUTION OF HOUSEHOLDS WITH OTHER SALES: RAPTI

Districts	Market Strata	Sample Size	No. with Livestock Sales	No. with Fruits & Veg. Sales	No. with Any Sales 1/	Chi-Square 2/
1	2	3	4	5	6	7
Dang	I	108	20 (18.5)	7 (6.5)	69 (63.9)	
	II	59	6 (10.2)	0 (-)	42 (71.2)	
	III	104	18 (17.3)	4 (3.8)	63 (60.6)	
	Total	271	44 (16.24)	11 (4.1)	174 (64.21)	
Salyan	I	53	6 (11.3)	5 (9.4)	15 (28.3)	
	II	69	13 (18.8)	5 (7.2)	21 (30.4)	b)6.68*
	III	74	15 (20.3)	0 (-)	18 (24.3)	(df=2)
	Total	196	34 (7.3)	10 (5.1)	54 (27.5)	
Pyuthan	I	59	6 (10.2)	0 (-)	9 (15.2)	
	II	57	6 (10.5)	0 (-)	9 (15.8)	
	III	74	7 (9.5)	0 (-)	16 (24.3)	
	Total	190	19 (10.0)	0 (-)	34 (17.9)	
Rolpa	II	97	1 (1.0)	2 (2.1)	6 (6.2)	
	III	101	2 (1.9)	0 (-)	6 (5.9)	
	Total	198	3 (1.5)	2 (1.0)	12 (6.1)	
Rukum	II	53	20 (37.7)	3 (5.7)	26 (49.1)	a)4.3*
	III	95	53 (55.8)	12 (12.6)	65 (68.4)	
	Total	148	73 (49.3)	15 (10.1)	91 (61.5)	
Rapti	I	220	32 (14.5)	12 (5.5)	93 (42.3)	a)8.94*
	II	335	46 (13.7)	10 (2.9)	104 (54.0)	c)7.66*
	Total	1003	173 (17.2)	38 (3.8)	365 (36.4)	(df=2)

Figures in the parenthesis indicate respective percentage in terms of the sample households in each stratum (row percentage).

1/ Col. 6 represents households who report sales of any of the following: crops, livestock products, live animals or fruit and vegetables.

2/ The 3 different Chi-square statistic reported test the statistical association between market access strata and the following:

a) proportion with livestock sales.
b) proportion with fruit and vegetable sales.
c) proportion with sales of any item.

Unreported Chi-square categories imply it is not significant.

TABLE 3.12 B

DISTRIBUTION OF HOUSEHOLDS WITH OTHER SALES: RCU

Districts	Market Strata	Sample Size	No. with Livestock Sales	No. with fruit & Veg. Sales	No. with Any Sales 1/	Chi-Square 2/
1	2	3	4	5	6	7
Gorkha	I	72	18 (25.0)	1 (1.4)	26 (36.1)	c)10.3*
	II	104	34 (32.7)	1 (0.9)	49 (47.1)	(df=2)
	III	76	16 (21.1)	0 (-)	18 (23.7)	
	Total	252	68 (26.9)	2 (0.8)	93 (36.9)	
Myagdi	I	49	3 (6.1)	2 (4.1)	11 (22.4)	a)6.46*
	II	72	3 (4.2)	2 (2.8)	8 (11.1)	(df=2)
	III	70	11 (15.7)	0 (-)	15 (21.4)	
	Total	191	17 (8.9)	4 (2.1)	34 (17.8)	
Mustang	I	62	9 (14.5)	10 (16.1)	23 (37.1)	b)6.4*
	II	39	12 (30.8)	12 (30.8)	24 (61.5)	c)10.8*
	III	59	10 (16.9)	7 (11.9)	17 (28.8)	(df=2)
	Total	160	31 (19.4)	29 (18.1)	64 (40.0)	
RCU Total	I	183	30 (16.4)	13 (7.1)	60 (32.8)	c)8.71*
	II	215	49 (22.8)	15 (6.9)	81 (37.7)	(df=2)
	III	205	37 (18.0)	7 (3.4)	50 (24.4)	
	Total	603	116 (19.2)	35 (5.8)	191 (31.7)	

Figure in the parenthesis indicate respective percentage in terms of the sample households in each stratum (row percentage).

1/ and 2/: as in Table 3.12 A

The only other statistically significant associations between market strata and the proportion of households with sales occur in the case of livestock sales in Myagdi, and fruit and vegetables sales in Salyan (where no cases occur in MS III) and Mustang (31% sales in MS II). The latter two instances are partially consistent with the market strata classification; but not the case of Myagdi because the sales proportion is substantially higher in MS III.

3.32 The distribution of households with sales of any item closely resembles that of households with crop sales in Dang because the latter group forms the largest subset of the former. In other words, most of the households in Dang with livestock and fruit/vegetable sales also happen to have crop sales. Such an overlapping does not generally occur in the other districts where the proportion of households with any sale is quite different from that of sales of the three separate items in one or more stratum. A statistically significant association between market stratum and sales of any item occurs in three instances - Gorkha and Mustang, where the proportion of sales is highest in MS II, and Rukum where it is higher in MS III than in MS II.

3.33 A more general picture of the inter-stratum differences in the proportion of households with sales of any items can be obtained by pairwise comparison between two strata. The comparisons of interest are between MS I and III and between MS II and III. In both cases the expected result is a higher sales proportion in the former than the latter category. The results of these comparisons are summarized in Table 3.12. Of the six districts where strata I and III are defined (excluding

Rolpa, Rukum) in five cases the proportion of households with sales is higher in stratum I. Pyuthan is the lone exception. In the comparison between strata II and III, again five cases yield the expected result. The opposite result holds again in Pyuthan, and in Rukum and Myagdi. The MS I and III comparison in Myagdi is of the expected direction. So only for Pyuthan and Rukum the choice of sampling sites to reflect market access is not even partially corroborated on the basis of the proportion of sales among sample households.

3.34 Rukum and Pyuthan give some cause for concern about the appropriateness of the sampling design and choice of sample sites. Both of these districts, along with all the others except Dang, are, however, areas of widespread food scarcity. Sales and exchange of farm products are usually made among households in the same locality; and almost all households are both sellers and buyers at different times in the cropping cycle. Information on household purchases of food items was collected in the survey. But because of the need to handle a wide variety of items and to distinguish between partially processed food items (e.g. flour) and non-processed grains, the problem of identifying net sellers or genuinely surplus households proved intractable. In such a context, the proportion of households who report any sales cannot be taken as a hard and fast indicator of market access. Moreover, the apparent contradiction on this account in Rukum and Pyuthan is not a general result which occurs in all the sample sites. The higher proportion of sales in MS III is due in both cases to one panchayat only - Baraula in Pyuthan and Athbisakot in Rukum.

(iv) Average producer prices

3.35 The problems that occur in associating market access to more favourable producer prices within the study areas of Rapti and RCU zones were briefly noted in Chapter II (section A). Table 3.14 reveals that this indeed is the case. An aggregate crop price index (CPI) was computed for each sample site as a weighted average of the after - harvest price of all the major crops (including potatoes, if relevant) grown within the district. The weights are derived on the basis of the estimated total land area given to each crop in a district*. So these weights vary for districts but not for the market strata within a district. Observed differences in the CPI within a district, thus, cannot be traced to crop composition differences even though actual cropping rotations and the relative importance of a particular crop will vary from one sample site to another.

3.36 Among the Rapti districts, the district average CPI ranges from Rs.9.26 (per pathi of a weighted index of crops) in Pyuthan to Rs.6.62 in Rukum. It is unusual that prices in Dang are higher than in the food deficit hill districts (excepting Pyuthan). MS I in Dang (Ghorahi and Tulsipur) has an average CPI of Rs.9.37 which can possibly be attributed to favourable market access; but prices are just as high in MS III of Dang (Rs.9.21). At the other end, the very low prices in Rukum belies its extreme remoteness. Similarly, the large relative differences between prices in Salyan and Pyuthan is unexpected. In the RCU areas, the uniformly high average CPI in Mustang is consistent with its remoteness and the need to transport grain in from the south. The slightly lower prices in Myagdi is also explained within this trans-

* See Appendix B.

TABLE 3.13

PROPORTION OF HOUSEHOLDS WITH ANY SALES: PAIRWISE COMPARISON BY MARKET ACCESS STRATA

Comparison Basis	No. of Possible Comparisons	No. With the Expected Results a/	No. With the Opposite Results
MS I VS. MS III			
Rapti	3	2	1 (Pyuthan)
RCU	3	3	0
MS II VS, MS III			
Rapti	5	3	2 (Pyuthan Rukum)
RCU	3	2	1 (Myagdi)

a/The expected result is a higher proportion of households reporting sales in the relatively better market access stratum - e.g. higher proportion in MS I than MS II; and a higher proportion in MS II than MS III.

TABLE 3.14

AVERAGE AGGREGATE PRODUCER PRICE (CPI)

(Rs/pathi)

Districts	Market Strata I	II	III	District Average
Dang	9.37	8.39	9.21	9.02
Salyan	6.3	6.64	6.49	6.51
Pyuthan	8.68	9.15	9.53	9.26
Rolpa	x	8.57	8.89	8.78
Rukum	x	6.97	6.27	6.62
Gorkha	7.65	7.95	6.73	7.48
Myagdi	10.54	13.88	13.24	13.13
Mustang	16.48	16.54	15.67	16.15

N.B. These aggregate crop prices for each panchayat has been estimated as a weighted average of selected crops. The weights have been determined on the basis of total land given to each crop within a district. See Appendix B for the derivation of those weights and the CPI.

portation network. Prices in Gorkha are very much lower. All of these inter-district comparisons should, however, be viewed with caution since they are due also to the changing weights attached to individual crops used in estimating the CPI.

3.37 Looking at price differences among market strata of a particular district, the observed variation in the CPI is usually very small and no clear pattern emerges. The CPI is highest in MS I of Dang but lowest in MS I of Salyan, Pyuthan and Myagdi. Of the six possible comparisons between MS I and MS III, three show a higher CPI in MS I and three in MS III. The comparison between MS II and MS III is more in line with the sample strata with 5 out of 8 pairwise comparisons showing higher prices in MS II. But there is a danger of trying to read too much into these very small differences.

(v) Price awareness

3.38 Household perception of market prices is also an important dimension of market access. The expected relationship is that awareness of local market conditions, including prices, will be greater in areas with better market access. Price awareness information was collected on two items. Household respondents were asked (i) whether they were aware of the range of seasonal price fluctuation for the principal crops; and (ii) whether prevailing market prices were known before goods were taken to be sold. Responses to the first question were coded as

"yes" or "no"; for the second question, a third category of "no sales" was a possible response also.[9]

3.39 The percentage distribution of the possible response on these two questions are reported in Table 3.15. Great significance should not, however, be attached to this data. Subsequent questions were not asked to test the validity of the respondent's answers. In questions of this type dealing with the subjective acknowledgement of a respondent's "knowledge", the proper negative responses may not be forthcoming for status reasons. The large number of "no" answers to both questions suggest that such perception was not a general problem; but even a few cases can distort the inter-stratum comparison should they be concentrated in one or two strata. For these reasons, statistical tests of association (Chi-square) are not carried out.

3.40 Among the Rapti districts, price awareness is highest in Dang and lowest in Salyan (again surprisingly) on prices prior to sales. Price fluctuation information is also unexpectedly highest in Rukum, the corresponding lowest is in Rolpa. Awareness of prevailing prices is always greater than that of price fluctuation; but on both counts the proportion of households responding yes in all of Rapti zone is small - 23.7% and 12.8% respectively. Price awareness

9/ This "no sales" response was not intended to conform with the household's actual market participation but to indicate whether the respondent himself causally related market price information to market participation.

TABLE 3.15 A

PERCENTAGE DISTRIBUTION OF PRICE AWARENESS INDICES: RAPTI

Districts	Market Strata	Sample Size	Price Information Before Sales			Price Fluctuation Information	
			Yes%	No%	No Sale%	Yes%	No%
Dang	I	108	54.5	41.7	3.8	30.6	69.4
	II	59	35.6	62.7	1.7	10.2	89.8
	III	104	28.9	60.6	10.6	7.7	92.3
	Total	271	40.6	53.5	5.9	17.3	82.7
Salyan	I	53	22.6	9.4	67.9	9.4	90.6
	II	69	4.4	50.7	44.9	2.9	97.1
	III	74	4.1	24.7	71.2	4.1	95.9
	Total	196	9.2	29.7	61.0	5.1	94.9
Pyuthan	I	59	22.0	20.3	57.3	04.8	
	II	57	7.0	3.5	89.5	7.3	92.9
	III	74	22.9	41.9	35.5	6.8	93.2
	Total	190	17.9	23.7	58.4	9.5	90.5
Rolpa	II	97	32.9	67.0	0	4.1	95.9
	III	101	1.9	44.6	53.5	0.9	99.0
	Total	198	17.2	55.6	27.3	2.5	97.5
Rukum	II	53	41.5	54.7	3.8	43.4	56.6
	III	95	21.2	71.6	7.4	26.6	73.4
	Total	148	28.4	65.5	6.1	32.7	67.3
Rapti	I	220	38.2	28.2	33.6	21.4	78.6
	II	335	24.5	50.1	25.4	11.6	88.4
	III	448	16.1	50.2	33.5	9.4	90.2
	Total	1003	23.7	45.4	30.8	12.8	87.0

All figures are percentages of the respective sample size in each market access stratum.

TABLE 3.15 B

PERCENTAGE DISTRIBUTION OF PRICE AWARNESS INDICES: RCU

			Price Information Before Sales			Price Fluctuation Information	
Districts	Market Strata	Sample Size	Yes%	No%	No Sale%	Yes%	No%
Gorkha	I	72	38.9	29.2	31.9	11.3	88.7
	II	104	33.7	46.2	20.2	12.5	87.5
	III	76	7.9	26.3	65.8	2.6	97.4
	Total	252	27.4	35.3	37.3	9.2	90.8
Myagdi	I	49	18.4	44.9	36.7	8.2	91.8
	II	72	2.8	2.8	9.4	1.4	98.6
	III	70	1.4	61.4	37.1	1.4	98.6
	Total	191	6.3	35.1	58.6	3.2	96.8
Mustang	I	62	40.3	20.9	38.7	15.0	85.0
	II	39	41.0	25.6	33.3	15.4	84.6
	III	59	28.8	42.4	28.8	6.8	93.2
	Total	160	36.3	30.0	33.8	8.2	87.9
RCU	I	183	33.9	30.6	35.5	11.5	86.9
	II	215	24.7	27.9	47.4	9.3	90.2
	III	205	11.7	42.9	45.4	3.4	96.6
	Total	603	23.1	33.8	43.1	7.9	91.4

All figures are percentages of the respective sample size in each market access stratum.

in the RCU areas shows a similar pattern and range of relative difference, with Myagdi showing the least awareness on both counts.

3.41 Price awareness is clearly related to market access strata in the Rapti as well as RCU sample. The proportion of households aware of prices prior to sale is always higher in MS I (MS II in Rolpa and Rukum) that in MS III, with the exception of Pyuthan. Very large relative differences occur in cases where price awareness is limited such as Salyan (23% yes response in MS I vs. 4% in MS III) as well as when price awareness is more general such as Dang (55% in MS I vs. 29% in MS III) and Myagdi. For all of Rapti the proportion of households aware of prevailing prices is 38.2%, 24.5% and 16.1% in MS I, II and III, respectively. In the RCU area the corresponding proportions are 33.9%, 24.7% and 11.7%, respectively.

3.42 Awareness of seasonal price fluctuation is even more clearly related to market stratum. In all districts the proportion of an yes answer is lowest in MS III. The relative differences less striking because this type of price awareness is more limited in the sample. Nonetheless, in Dang the variation is from 31% in MS I to 8% in MS III and in Rukum from 43% to 27% respectively.

3.43 It was noted above that a greater margin of error occurs in the analysis of subjective responses such as these used in measuring price awareness. In spite of this, the systematic relation between price awareness and market access indicated in Tables 3.15 A and B is very, and one must add unexpectedly, strong.

C. MARKET ACCESS RELATED CHARACTERISTICS

Market access has been defined in terms of proximity to large retail market centres. On this basis of stratification, the most favourable market access tends to occur in areas of relatively larger population concentration which tend to be in or near the respective district headquarters or other administrative centres. Given the primary role of the public sector in providing development support services in the study areas - e.g. agricultural extension, credit, transportation, etc. - it is natural that these support services become concentrated in the administrative centres or "towns". Market access is then indirectly related to the availability and use of such services.

(i) Modern Farming Inputs

3.45 Market access should not only facilitate access to improved seeds, fertilizers etc., but also increase household demand for these modern inputs. Other things remaining the same, better market access should be associated with greater adoption of modern cultivation techniques from a profitability perspective. The proportion of households who report use of chemical fertilizers and improved seeds are reported in Table 3.16. In both cases the degree of association with market access is very strong and in the expected direction.

3.46 In the matter of fertilizer use, the strata constrast is clearest in Dang where 44% and 52.5% of households in MS I and II report fertilizer use while the corresponding proportion is a meagre 4.8% in MS III. Differences of a similar range occur in Gorkha and Mustang where, respectively,

TABLE 3.16 A

DISTRIBUTION OF IMPROVED SEED AND CHEMICAL FERTILIZER USE: RAPTI

Districts/ Market Strata	Dang		Salyan		Pyuthan		Rolpa		Rukum		Rapti total	
	I	F	I	F	I	F	I	F	I	F	I	F
I	43 (39.8)	48 (44.4)	11 (20.8)	5 (9.4)	36 (61.0)	25 (42.4)	x	x	x	x	90 (40.9)	78 (35.45)
II	11 (18.8)	31 (52.5)	2 (2.9)	6 (8.7)	16 (28.1)	7 (12.3)	13 (13.4)	13 (13.4)	25 (47.2)	18 (34.0)	67 (20.0)	75 (22.39)
III	7 (6.7)	5 (4.8)	8 (10.8)	5 (8.6)	41 (55.4)	4 (5.4)	8 (7.9)	4 (4.0)	27 (28.4)	1 (1.1)	91 (20.3)	19 (4.24)
Total	61 (22.5)	84 (31.0)	21 (10.8)	16 (8.2)	93 (48.9)	36 (18.9)	21 (10.6)	17 (8.6)	52 (35.1)	19 (12.8)	248 (24.7)	172 (17.15)
Chi-Square a/	33.4*	52.3*	9.9*	.34	14.6*	31.6*	1.6*	5.5*	5.2*	32.9*	37.7*	110.9*

Figures in parenthesis are percentages of the stratum sample size.

I = Use of improved seeds.

F = Use of chemical fertilizers.

a/ The reported Chi-Square statistics is with 2 degrees of freedom for Dang, Salyan and Pyuthan; with 1 degree of freedom for Rolpa and Rukum.

TABLE 3.16 B

DISTRIBUTION OF IMPROVED SEEDS AND CHEMICAL FERTILIZER USE: RCU

(Number of Households)

Districts	Gorkha		Myagdi		Mustang		RCU Total	
Market Strata	I	F	I	F	I	F	I	F
I	35 (48.6)	35 (48.6)	12 (24.5)	9 (18.4)	40 (77.4)	42 (67.7)	95 (51.9)	86 (47.0)
II	38 (36.9)	33 (31.7)	16 (21.3)	10 (13.9)	16 (41.0)	16 (42.1)	70 (32.6)	59 (27.4)
III	7 (9.2)	2 (2.6)	4 (5.7)	2 (2.9)	19 (32.2)	3 (5.1)	30 (14.6)	7 (3.4)
Total	80 (31.9)	70 (27.8)	32 (15.7)	21 (10.0)	83 (51.9)	61 (38.4)	195 (32.3)	152 (25.2)
Chi-Square a/	28.45*	40.34*	9.76*	8.07*	27.18*	50.48*	61.42*	98.29*

Percentages are with respect to the stratum sample size.

I = Use of improved seeds.

F = Use of chemical fertilizers.

a/ The reported Chi-square statistic is with 2 degrees of freedom for all categories.

the corresponding proportions are 48.6% and 67.7% in MS I compared to 2.6% and 5.1% in MS III. In all eight districts, the frequency of chemical fertilizers use is higher in stratum I and II than in III. The highest reported use of fertilizer in stratum III is 5.8% among Rapti districts (Salyan) and 5.1% in the RCU areas (Mustang). The observed lower incidence of use in MS II and III compared to MS I is statistically significant in all districts except in the case of Salyan. Salyan surprisingly turns out to be the district with the lowest use of chemical fertilizers, only 16 out of 196 households. This proportion (8.2%) is lower than in Rukum (12.8%) and Rolpa (8.6%).

3.47 The distribution of households using improved seeds shows an even stronger association with market access. In each and every district the frequency of use is higher in MS I than in MS III. Except for Salyan, it is also higher in stratum II than in III. The chi-square test of association rejects the null hypothesis of no significant association between market strata and improved seed use in all cases.

(ii) Access to Institutional Credit

4.48 The number of households who report borrowing specifically for production purposes within the annual reference period is indicated in Table 3.17. The highest proportion within a district (12%) occurs in Pyuthan where the relative frequencies in each of three market access stratum are approximately equal. In the other Rapti districts there is also no tendency for the incidence of production credit to be related to market access. Only MS II in Dang has a

TABLE 3.17 A

DISTRIBUTION OF PRODUCTION CREDIT AND SOURCES OF BORROWING: RAPTI

Districts	Market Strata	Sample Size	No. with Production Credit	Institutional Source
Dang	I	108	6 (5.6)	4 (3.7)
	II	59	12 (20.3)	4 (6.8)
	III	104	8 (7.7)	1 (0.9)
	Total	271	26 (9.6)	9 (3.3)
Salyan	I	53	2 (3.8)	2 (3.8)
	II	69	1 (1.5)	1 (1.5)
	III	74	3 (4.1)	0 (-)
	Total	196	6 (3.1)	3 (1.5)
Pyuthan	I	59	8 (13.6)	7 (11.9)
	II	57	6 (10.5)	5 (8.8)
	III	74	9 (12.2)	6 (8.1)
	Total	190	23 (12.1)	18 (9.5)
Rolpa	II	97	7 (7,2)	6 (6.2)
	III	101	4 (3.9)	2 (1.9)
	Total	198	11 (5.6)	8 (4.)
Rukum	II	53	3 (5.7)	1 (1.9)
	III	95	10 (10.5)	1 (1.1)
	Total	148	13 (8.3)	2 (1.4)
Rapti	I	220	16)7.3)	13 (5.4)
	II	335	29 (8.7)	17 (5.1)
Total	III	448	34 (7.6)	10 (2.2)
	Total	1003	79 (7.9)	40 (4.0)

Figures in the parenthesis indicate percentages in terms of the sample households in each stratum (row percentage).

N.B. The Chi-Square test of the association between market access and the frequency of households with production credit shows a significant relation only in Dang (Chi-Square statistic = 10.31* with 2 degrees of freedom).

TABLE 3.17 B

DISTRIBUTION OF PRODUCTION CREDIT AND SOURCES OF BORROWING: RCU

Districts	Market Strata	Sample Size	No.with Production Credit	Institutional Sources
	I	72	6 (8.3)	5 (6.9)
Gorkha	II	104	13 (12.5)	10 (9.6)
	III	76	2 (2.6)	0 (-)
	Total	252	21 (8.3)	15 (5.9)
	I	49	8 (16.3)	2 (4.1)
Myagdi	II	72	3 (4.2)	1 (1.4)
	III	70	5 (7.1)	0 (-)
	Total	191	16 (8.4)	3 (1.6)
	I	62	6 (9.7)	4 (6.5)
Mustang	II	39	1 (2.6)	1 (2.6)
	III	59	1 (1.7)	1 (1.7)
	Total	160	8 (5.0)	6 (3.8)
	I	183	20 (10.9)	11 (6.0)
RCU	II	215	17 (7.9)	12 (5.6)
Total	III	205	8 (3.9)	1 (0.5)
	Total	603	45 (7.5)	24 (4.0)

Figures in the parenthesis indicate respective percentage in terms of the sample household in each stratum (row percentage)

N.B. The Chi-Square test of association between market access and the frequency of households with production credit shows a significant relation only in the total sample for RCU and not for any district (Chi-Square statistic = 7.01* with 2 degrees of freedom for the RCU total sample).

relatively higher proportion of 20%; otherwise the incidence of production credit is similar across market access strata. In the RCU districts, one finds a slight relationship. Production credit in MS III of Gorkha and Mustang is very limited in absolute terms and in relation to the other two strata.

4.49 The association with market access strata is more clearly revealed in looking at the sources of production credit. As expected, institutional borrowing (from cooperatives, the Agricultural Development Bank and other commercial banks) is related to market access. Institutional credit is observed in greater frequency in MS I and MS II than in MS III in each of the eight district samples.

(iii) Cost of Farm Cultivation (Purchased Inputs)

4.50 If market access facilitates use of modern inputs and makes a higher intensity of land cultivation profitable, then the likely effect of both of these factors is to increase the purchased costs of cultivation per unit of land. Purchased costs refer to all inputs supplied from non-family sources - hired human and bullock labour, chemical fertilizers, seeds etc. The comparison of these costs of cultivation per ropani of land is reported in Table 3.18 by market access stratum and also between households with the without crop sales.

4.51 Use of purchased inputs is higher in the more favourable market access samples; and this association is very clear. Average costs decline systematically from MS I to MS III in all of the Rapti districts; and the stratum differences are

statistically significant in Dang and Rukum. The hypothesis of equal average costs of cultivation is also rejected in Myagdi district, although here the costs are lower in MS II and approximately equal between MS I and MS III. In Mustang, average costs are lowest in MS II also. There is a difference of about Rs.14 between MS II and MS III costs; but both figures are substantially (statistically significant) lower than the average cost in MS I of Rs.161 per ropani.

4.52 It turns out that the contrast in cost of cultivation between households with and without crop sales is more striking. Farm households who report crop sales have a higher unit cost of cultivation in all districts except Rukum. The difference in unit costs is often about double or even higher (Salyan, Pyuthan, Rolpa, Gorkha, Myagdi). Because of the limited number of cases with crop sales the statistical inference is limited. Only the difference in Rolpa, Gorkha and Myagdi is statistically significant. The most feasible explanation for this tendency is that households with the option of sales increase the intensity of cultivation by purchasing more inputs.[10/] The extra costs are not an economic burden but an investment that yields greater production and profit.

10/ It is possible that the causation can run the other way. Some households may be forced to rely more on purchased inputs of cultivation due to exogenous reasons (i.e. small family size or no family owned bullocks). These households may then be "forced" to market their output to recover in cash the proceeds of the input payments. Such a relation would also account for the correlation between market sales and higher purchased costs of cultivation. But if such a cash constraint were so dominant, the likelihood of average costs being additionally related to market access stratum would be small.

TABLE 3.18

AVERAGE COST OF PURCHASED INPUTS IN FARM CULTIVATION

(in Rupees per ropani of land cultivation)

Districts	Market Access Stratum					Type of households		
	I	II	III	Average	F - Value	w/crop sale	Without sales	F-Value
1	2	3	4	5	6	7	8	9
Dang	30.8	15.1*	8.9*	18.9	4.4*	19.2	18.6	n.s.
Salyan	14.4	7.5	6.4	8.9	n.s.	18.1	8.2	n.s.
Pyuthan	31.4	28.0	16.6	24.6	n.s.	40.2	23.2	n.s.
Rolpa	-	71.3	43.6	57.1	n.s.	10.6	6.9	n.s.
Rukum	-	40.5	12.3+	22.4	9.15*	17.9	24.3	n.s.
Gorkha	32.6	21.9	27.6	26.7	n.s.	46.5	22.5	11.0*
Myagdi	41.7	25.2*	17.1*	26.5	8.9*	45.2	24.6	6.68*
Mustang	161.2	49.9*	63.9*	97.8	3.78*	130.1	87.7	n.s.

N.B. The F-Value in column 6 tests for the equality of average costs among the market access strata while that in column 9 test for the equality of costs between households with and without crop sales.

n.s.= not significantly different at the 5% level.

CHAPTER - IV

MARKET ACCESS AND HOUSEHOLD PRODUCTION

4.1 Household production is estimated as the sum of the following three items: 1) the gross value of crop production evaluated at local harvest period prices; 2) a proxy estimate of livestock production; and 3) the sale value of fruits and vegetables. The items included under crop production are paddy, upland paddy, maize, wheat, millet, barley, oilseeds, pulses and potatoe; and in Mustang, also buck-wheat and uwa (naked-barley). Direct estimates of livestock as well as that of fruits and vegetables production require too much detailed information which was not attempted in a survey as extensive as the present one. As a proxy, production of fruits and vegetables is taken to be the value of actual sales. This is obviously a gross under-estimation since it ignores all of the home consumed production which can be substantially larger than the proportion sold. Fruit and vegetable production, however, is likely to account for only a small fraction of overall household production. The net effect of this underestimation on household production is, hence, expected to be small.

4.2 Livestock production, on the other hand, is a very important economic activity in the survey region; and thus greater care must be given to its estimation. The procedure used estimates livestock production as the sum of the following three components:

1) total value of milk production

2) total sales of other non-milk-derived livestock products - e.g. meat, hides, wool, etc.

3) 20 percent of the sale value of all live animals.[1/]

When milk production or sales of any item are not reported by the sample household, 20% of the value of the current livestock holding is taken as a proxy for livestock production.

A. BIVARIATE ANALYSIS: ONE WAY ANOVA

(i) Distribution of Crop production

4.3 The mean value of crop production by market access strata is reported in Table 4.1 for Rapti and RCU zones along with the average size of land cultivation and the value of production per ropani of land cultivated. The average value of crop production for a district ranges from Rs.9482 per household in Dang and Rs.8241 in Mustang to Rs.3485 in Rolpa and Rs.3190 in Salyan. The average size of land cultivation is also higher in Dang; and this is the main reason for the highest average production. In Mustang, the high value of production occurs because of the high local prices at which physical production is valued (see Appendix B). But the lowest average value of

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1/ Sales of large live animals represent a depletion of the capital assets of farm household. It is a stock value as opposed to the flow measurements of animal husbandry production and income. One cannot readily reconcile these two different types of measurements without details on the natural fertility, the average period of rearing prior to sales or productive use, etc. It is unfortunate that in the context of Nepalese agriculture no detailed methods have been developed to estimate annual livestock production (and income) at the household level inspite of its great importance. The usual method followed, as in the Baseline Survey, is to equate livestock income to sales only, which is clearly a gross underestimation.

production in Salyan comes as a surprise.[2/]

4.4 From the perspective of inter strata differences within a district, comparisons are made for both the average value of crop production per household (TCQV) and average productivity per cultivated area (CQCA). The latter provides a more meaningful result since land size was not held constant across different market access strata. But it is difficult to uncover statistically significant differences in average productivity within a small and uncontrolled sampling procedure. Productivity usually varies widely within any group such that inter-group differences become meaningful only with the aid of very large sample sizes. On the other hand, the observed differences in average land size among market access strata can be attributed to random sampling variation in all except two districts - Dang and Mustang. In the other districts, equally valid inferences about the effects of market access can be drawn by comparing total household crop production.

4.5 In districts where three market access strata have been identified, when production is highest in strata I and then in strata II and lowest in strata III, it can be said that a systematic relation between market access and production exists. When such a clear pattern does not occur three pairwise comparisons are possible: between MS I and MS III; between MS II and III; and between MS I and II. The first

2/ The Baseline Survey of Rapti reports higher crop yields in Salyan than in Rukum (Table 3.1.5) and a higher adjusted income than in Rukum and Rolpa (Table 3.5). The inconsistency with our sample design is a good example of the ambiguity which occurs in making inter - district comparisons from a sampling methodology not designed for such a purpose.

two comparisons are of greater relevance for us because there is greater certainty about the relatively limited market access characteristics of stratum III than about the relative difference between stratum I and II (except in Dang where Ghorahi and Tulsipur stand in clear constrast to all the other sample sites).

4.6 With these provisions, Table 4.1 shows that in each and every district there is strong evidence that crop production is affected by market access. A systematic relation occurs in Dang and Gorkha for both total production and average productivity. In Gorkha household crop production in MS I is almost 3 times that of MS III, and the difference in productivity (average yield) is even higher. For both variables, the three strata means are significantly different - i.e. the null hypothesis of equal means is statistically rejected. In Dang the systematic relationship is significant only for total production; for average productivity, only the MS I mean is significantly higher than in MS III. In Salyan a systematic relation occurs with respect to total production. The MS I mean (Rs.4171) is significantly higher than the MS III mean (Rs.2618). A systematic relation does not occur in terms of average productivity because the MS III yield is higher than MS II; but both are significantly less than the MS I average yield.

4.7 The inter-stratum differences in total production and yield are less clearcut in the remaining Rapti districts. In Pyuthan production is higher is MS I; but average productivity is approximately equal in all three cases. In Rolpa total production is higher in MS III by about Rs.90; but productivity is higher is MS II though the difference is not

TABLE 4.1

VALUE OF HOUSEHOLD CROP PRODUCTION: RAPTI AND RCU

Districts	a/	MS I	MS II	MS III	Average	F-Value
	TCQV	12140	10724	6017*+	9482	7.5*
Dang	LDCL	(62.3)	(65.1)	(36.8)	(53.0)	
	CQCA	221	184	180*	197	2.2
	TCQV	4171	3049	2618*	3190	2.5
Salyan	LDCL	(21.)	(17.6)	(14.0)	(17.1)	
	CQCA	266	192*	206*	218	5.0*
	TCQV	5364	4342	4738	4817	0.7
Pyuthan	LDCL	(11.3)	(9.8)	(10.9)	(10.7)	
	CQCA	487	495	470	483	0.2
	TCQV	-	3374	3571	3485	0.02
Rolpa	LDCL	-	(9.9)	(11.8)	(10.9)	
	CQCA	-	425	380	402	1.5
	TCQV	-	3405	3569	3510	0.1
Rukum	LDCL	-	(10.3)	(12.6)	(11.8)	
	CQCA	-	504	367*	416	4.3*
	TCQV	7544	5089*	2553*+	5026	5.5*
Gorkha	LDCL	(14.9)	(19.5)	(16.1)	(17.2)	
	CQCA	562	299*	171*+	336	48.1*
	TCQV	4887	4670	3822	4415	1.8
Myagdi	LDCL	(14.1)	(10.9)	(12.6)	(12.4)	
	CQCA	388	519*	400+	442	3.3*
	TCQV	7251	15512	4476*+	8241	39.8*
Mustang	LDCL	(8.2)	(16.8)	(10.0)	(10.9)	
	CQCA	1166	1012	542*+	897	13.0*

a/ The variable definitions are as follows:

TCQV = total value of crop production (including potatoes) in rupees

LDCL = amount of land cultivated in ropani

CQCA = value of crop production per ropani of land cultivated i.e., TCQV ÷ LDCL, in rupees.

statistically significant. Finally in Rukum, total production is also higher in MS III; but it is due largely to the land size effect. The average value of crop yield is significantly higher in MS II.

4.8 As for the RCU areas, the systematic pattern of Gorkha is not repeated in Mustang or Myagdi. But the effects of market access are clearly demonstrated in Mustang. Average crop production is the lowest in MS III; and the average yield is approximately half of that in the other two strata. In Myagdi, a systematic relationship occurs with respect to total production. But this pattern is thrown out of sequence when comparing average productivity because it is highest in MS II and lowest in MS I. The difference between the MS I and MS III means is not significant. Nevertheless, the fact that the lowest productivity occurs in stratum I makes Myagdi the only case where the expected relationship between market access and the value of crop production is directly contradicted.

(ii) Livestock Production

4.9 The average value of livestock production per household is indicated in Table 4.2. It is difficult to relate annual livestock production to a stock variable which measures the household's productive capacity like land size does for crop production. The estimated total value of livestock holdings is often used in this context as a control variable and this information is also noted in Table 4.3. One should note, however, that the value of livestock holding gives a very approximate degree of control because it glosses over important distinctions in the type of livestock, variety of

products, and in the timing of productive intervals (e.g milching periods).

4.10 The value of livestock holding is highest in Mustang Rs.16,000 per household. This exceptionally high figure occurs in Mustang because it includes the value of pack animals (ponies) kept by households for transportation purposes. In the other districts the average value of livestock holding ranges from Rs.6,500 in Dang to Rs.3,590 in Salyan.

4.11 The distribution of the estimated annual livestock production per household does not clearly follow that of the value of livestock holding. Average livestock production in Mustang (Rs.2215) is lower than in Rukum (Rs.2487) and Gorkha (Rs.2299). (Rental income from pack animals - which is important in Mustang - have not been included in livestock production but in other household business income). The lowest values of livestock production occur in Myagdi (Rs.972) and Salyan (Rs.779); and this result is consistent with the observed value of livestock holdings.

4.12 The relation between livestock production and market access strata within a district is less clear than in the case of crop production. Only Dang, Mustang and Gorkha show a significantly higher livestock production in MS I than III. In Myagdi the difference is in the expected direction but minor. For the remaining Rapti districts, livestock production per household is higher in stratum III. Such a result is not entirely contradictory with the expected assumed relationship between household production and market

TABLE 4.2

VALUE OF HOUSEHOLD LIVESTOCK PRODUCTION: RAPTI AND RCU

Districts	a/	MS I	MS II	MS III	Average	F-Value
Dang	LSQV	2886.2	1924.1	879.6*+	1906.6	2.67
	LSV	6.9	7.6	5.5	6.5	1.54
Salyan	LSQV	740.7	732.3	849.9	779	0.30
	LSV	3.3	3.9	3.5	3.6	0.71
Pyuthan	LSQV	763.0	1215.5*	1402.8*	1159.6	4.21*
	LSV	3.9	5.0	6.3*	5.2	4.65*
Rolpa	LSQV	-	1167.9	1212.1	1190.4	0.04
	LSV	-	4.9	6.4	5.7	2.4
Rukum	LSQV	-	1870.2	2831.6+	2487.3	4.32*
	LSV	-	3.3	5.7+	4.5	11.6*
Gorkha	LSQV	2371.5	2913.1	1389.6*+	2298.9	4.32*
	LSV	4.5	5.9*	4.1+	4.9	4.29*
Myagdi	LSQV	1100.9	858.4	998.9	972.1	0.79
	LSV	3.8	2.9	4.8*	3.8	4.05*
Mustang	LSQV	3698.1	1258.9*	1288.9*	2215.2	12.80*
	LSV	24.9	6.3*	13.2*+	16.1	10.88*

a/ The variables defined are as follows:

LSQV = estimated value of annual livestock production in rupees

LSV = estimated value of livestock holdings at time of the survey, in '000 rupees

access. In all these cases the higher values of livestock production in MS III can be traced to higher values of livestock holding. For instance, in Pyuthan the average value of livestock owned by a household decreases from Rs.6330 in MS III to Rs.5030 in MS II and Rs.3860 in MS I. Similarly the estimated value of annual livestock production decreases from Rs.1403 to Rs.1216 to Rs.763 per household in these strata, respectively.

4.13 A lower value of livestock holding in stratum I households is not an unexpected result. Livestock rearing in areas close to large retail market centres may not be as easy or profitable because of the problems of inadequate space or pastures. Households close to market centres may opt for more profitable ventures (e.g. cottage industry activities or shopkeeping) in lieu of livestock. Furthermore, the sample panchayats for MS III are usually located in the northern zones of the Rapti Hill districts because market access is differentiated on a north-south axis in these districts. Households in the northern reaches are likely to place greater emphasis on livestock rearing because of poorer prospects for crop cultivation. Hence Table 4.2 does not contradict the expected positive effect of market access on household livestock production. It is necessary to first separate out the effects of the ecological zones, the occupational pattern and the value of livestock holding for which a multivariate analysis is needed.

(iii) Fruit and vegetable sales

4.14 Detailed information on fruit and vegetable production was not collected in the household survey; instead only the sale value of these items was taken as a proxy for production.

TABLE 4.3

FRUIT AND VEGETABLE SALES: RAPTI

Districts	Market Strata	Sample Size	No. with Fruit and Vegetable Sales	Average Sales (Rs) a/
Dang	I	108	7 (6.5)	442.9
	II	59	0 (-)	-
	III	104	4 (3.8)	437.6
	Total	271	11 (4.1)	440.9
Salyan	I	53	5 (9.4)	509.9
	II	69	5 (7.2)	199.9
	III	74	0 (-)	-
	Total	196	10 (5.1)	354.9
Pyuthan		190	Fruit & vegetable sales not reported in any stratum	
Rolpa	II	97	3 (3.1)	283.2
	III	101	0 (-)	-
	Total	198	3 (1.5)	283.2
Rukum	II	53	3 (5.7)	99.3
	III	95	12 (12.6)	132.5
	Total	148	15 (10.1)	125.8
Rapti Total	I	220	12 (5.5)	470.8
	II	335	11 (3.3)	195.2
	III	448	16 (3.6)	208.0
	Total	1003	39 (3.9)	285.6

Figures in the parenthesis represent the percentages in terms of sample households in each stratum

a/ The average value of sales for those households reporting any sales.

TABLE 4.4

FRUIT AND VEGETABLE SALES: RCU

Districts	Market Strata	Sample Size	No. with Fruit and Vegetable Sales	Average Sales (Rs.) a/
Gorkha	I	72	1 (1.4)	599.8
	II	104	1 (0.9)	19.0
	III	76	0 (-)	-
	Total	252	2 (0.8)	309.9
Myagdi	I	49	2 (4.1)	220.0
	II	72	2 (2.8)	330.1
	III	70	0 (-)	-
	Total	191	4 (2.1)	275.0
Mustang	I	62	9 (14.5)	1673.3
	II	39	12 (30.8)	954.3
	III	59	7 (11.9)	502.4
	Total	160	28 (17.5)	1072.5
RCU Total	I	183	12 (6.6)	1341.6
	II	215	15 (6.9)	808.8
	III	205	7 (3.4)	502.4
	Total	603	34 (5.6)	933.8

Figures in the parenthesis represent the percentages in terms of sample households in each stratum.

But the latter proved to be a very limiting indicator of production levels because very few cases of sales were recorded in any district. Nonetheless, the observed incidence and the total value of fruit and vegetable sales are still expected to be related to market access (Tables 4.3 and 4.4).

4.15 There are no sample households with sales of fruit and vegetables in Pyuthan; and in Rolpa, where three such cases occur, all are in stratum II. In the other districts where inter-stratum comparisons are possible, only Rukum gives contradictory results: the incidence as well as the average sale value for those households reporting any sales is higher in MS III. In Mustang and Salyan a systematic relation between market access and fruit and vegetable sales occur. The average sale value in MS I of Mustang is Rs.1673 which is more than three times the average of MS III. In Gorkha and Myagdi no sales occur in MS III but the significance of this result is lessened by the very small proportion of sales in the other two strata. In Dang no sales occur in MS II and the frequency of sales is higher in MS I than in III; but the average sales value are approximately equal.

(iv) Household production

4.16 Combining all three components, the difference in total household production by market strata is indicated in Table 4.5. At the district level the highest level of production - an average of Rs.11,408 per household - is recorded in Dang, as expected. The other districts in sequence are Mustang (Rs.10,644), Gorkha (Rs.7,327); and Pyuthan and Rukum have an approximately equal level of about Rs.6,000 per

household. Myagdi is a little lower at Rs.5,392, followed by Rolpa with Rs.4,680. Salyan has the lowest level of household production by a large margin: the average amount is Rs.3,943 per household which is only slightly more than one-third of the production level of Dang.

4.17 The expected difference in household production in relation to market access is most evident in Dang. Household production averages over Rs.15,000 in MS I and it decreases systematically in the other two strata. Statistically, both the MS I and MS II means are significantly higher than the MS III mean. But one must recall that these differences are due in large part to the smaller average size of land cultivation in MS III of Dang (see Table 3.1). Among the other Rapti districts, the positive association of market access and production also occurs in Salyan. In spite of the generally low level of production reported in Salyan, the difference between MS I and MS III is statistically significant. The other Rapti hill districts either show no definite relation between market access and production (such as in Pyuthan);[3/] or they show results contrary to the expected relationship: household production in stratum III of Rolpa and Rukum is higher than in stratum II. These contrary results in Rolpa and Rukum are, however, not statistically significant.

3/ The result in Pyuthan is also partially mitigated by a very uneven ethnic distribution of households. As indicated in Table 3.3, about half of the MS I households in Pyuthan are of the professional castes. Favourable market access may not be as relevant for the households as compared to the primarily land cultivating average household.

TABLE - 4.5

VALUE OF TOTAL HOUSEHOLD PRODUCTION RAPTI AND RCU

(in Rupees)

Districts	MS I	MS II	MS III	Average	F-Value
Dang	15054.9 (117.7)	12652.3 (82.9)	6914.0*+	11407.7	9.71*
Salyan	4959.5 (42.9)	3795.6 (9.4)	3468.2*	3[illegible]96.7	2.03
Pyuthan	6049.4 (98.5)	5493.9 (89.4)	6140.5	5918.2	0.26
Rolpa	-	4551.1 (-5.3)	4803.4	4679.8	0.3
Rukum	-	5280.6 (-17.7)	6417.1	6010.1	1.65
Gorkha	9923.4 (151.7)	8002.3 (102.9)	3942.7*+	7326.9	14.71*
Myagdi	5997.1 (24.4)	5538.0 (14.9)	4820.7	5392.9	1.33
Mustang	11191.6 (92.2)	17064.8 (192.9)	5824.4*+	10644.0	27.07*

The figures in parenthesis under MS I and MS II columns represent the percentage increase in production compared to the MS III level.

4.18 The effects of market access follow a more consistent pattern in the RCU areas. Household production declines systematically from MS I to MS III in both Gorkha and Myagdi. In the former case the observed differences are significant: household production declines from Rs.9,923 in MS I to Rs.3,943 in MS III. The difference in household production by market stratum in also significant in Mustang. Here the highest production level occurs in MS II rather than I; but they are both significantly higher than the mean level of production in MS III.

4.19 In summary, at the simple level of bivariate analysis between household production and market access, the expected relationship between better market access and higher farm production is observed in five out of the eight sample districts. These are Dang, Salyan, Mustang, Myagdi and Gorkha. The relationship is most systematic and statistically significant in Gorkha, Dang and Mustang; but the Dang result must be attributed partly to the significantly smaller size of cultivated land in MS III. In the remaining three districts, Pyuthan is a neutral case where average household production is more or less the same in each stratum. Rolpa and Rukum show a higher level of household production in the less favourable market access strata (MS III). But this unexpected difference in the opposite direction is due more to higher livestock production in MS III than to the difference in crop production. Such a pattern of livestock production is to be expected because MS III samples are drawn from the northern zones of these districts where livestock rearing is a relatively more important economic activity.

3.20 One of the more pronounced effects of favourable market access should be a high incidence and proportion of sales

relative to a given volume of production. Chapter III (sec. B iii) indicated that market participation is generally related to the stratum distinctions, with the exception of Rukum and Pyuthan. The previous section of this chapter indicated further that the average value of production is also usually related to market stratum. Favourable market access leads to higher production in five of the eight districts (excepting Rolpa, Rukum and Pyuthan). But when both of these issues are combined, the effect of market access on the average value of sales and on the ratio of sales to total production is not clearly established.

4.21 Information on the value of sales of a household is indicated in terms of four different categories in Table 4.5; and they are:

(i) the gross value of sales of all crops, including potatoes (TCMV);

(ii) the average value of crops sold per unit of land cultivated (CSPL);

(iii) the proportion of the gross value of crop sales to the gross value of crop production i.e. the crop sales to production ratio (CSRT).

(iv) the livestock sales to production ratio[4/]

The latter two proportions represent the appropriate marketed surplus ratios.

4.22 Within the Rapti districts, statistical comparison of the crop sale variables is meaningful in Dang and Rukum

4/ Livestock sales is defined as the sum of the value of all livestock products (e.g. milk, meat etc.) sold and 20% of the value of live animal sales. Livestock production is as defined above in paragraph 4.2.

TABLE 4.6 A

VALUE OF SALES AND SALES RATIO: a/ RAPTI

Districts b/		I	II	III	Average	F-Value
Dang CSPL	TCMV	1917 (55)	1651 (40)	800 (56)	1432 (151)	2.49
	CSRT	10.1	15.3	11.5	12.0	1.08
	CSPL	27.7	25.3	20.6	24.4	.48
	LSQR	50.1 (20)	32.9 (6)	47.6 (18)	46.7 (44)	.42
Salyan	TCMV	880 (6)	660 (6)	1788 (4)	1024 (16)	.77
	CSRT	14.2	8.1	11.2	11.2	.75
	CSPL	31.3	18.7	36.3	27.8	1.46
	LSQR	35.7 (6)	48.1 (13)	36.6 (15)	40.9 (34)	.44
Pyuthan	TCMV	2638 (4)	900 (3)	1390 (10)	1597 (17)	.79
	CSRT	19.38	8.1	14.6	14.6	1.15
	CSPL	63.2	55.6	78.9	71.6	.54
	LSQR	0 (6)	23.4 (7)	16.8 (7)	13.6 (19)	2.68
Rolpa	TCMV	-	1375 (4)	968 (5)	1149 (9)	.62
	CSRT	-	23.5	12	17.1	3.16
	CSPL	-	89.5	28.6*	55.7	5.73*
	LSQR	-	91.6 (1)	15.5 + (2)	40.9 (3)	110.31*
Rukum	TCMV	-	583 (13)	1810 (32)	1456 (45)	1.7
	CSRT	-	10.6	22.6+	19.2	3.48*
	CSPL	-	48.3	73.6	66.3	1.66
	LSQR	-	16.4 (20)	21.5 (53)	20.1 (73)	.66

a/ These are average values for the subset of households who report sales of the relevant items. The corresponding number of these households with sales are indicated in parenthesis.

b/ The variable definitions are as follows:

TCMV = total value of crop (and potatoe) sales (rupees)

CSRT = crop sales ratio of TCMV to total crop production (percentage)

CSPL = total crop sales value per ropani of land cultivation (rupees)

LSQR = ratio of total sales of livestock products to total value of livestock production (percentage)

only because the number of households with market participation in the other districts is minimal. The gross sale value of crops declines systematically in Dang from MS I to MS II to MS III. This is shown to be the effect of varying levels of production because the ratio of sales to total production (CSRP) is between 10 and 15% in each stratum. In Rukum, the crop sales values and ratios are higher in MS III than in MS II. The difference in the marketed proportion (CSRP) is significant. In general, a fairly uniform pattern holds within the district stratum sub-sample as well as across the districts in Kapti. The ratio of crop sales to production ranges from an extreme of 8% to 23%, and the value of sales per ropani does not exceed Rs.100 in any instance.

4.23 Strata differences in the RCU areas are most evident in Gorkha. The gross value of crop sales and sales per unit of land cultivation are significantly higher in order between MS I and II and III. In Mustang a slightly higher crop sales value and ratio are observed in MS II but the overall strata differences are not significant. The ratio of livestock sales varies greatly from about 5% to more than 60% in the RCU sample; but none of the districts show a statistically significant pattern of livestock sales varying with market access.

4.24 A preliminary conclusion to be drawn is that actual market participation is not as directly related to the level of household differences in production as might be normally expected. Table 4.5 indicated substantial difference in household production among market access stratum for most of the districts. A similar range of differences in the

TABLE 4.6 B

VALUE OF SALES AND SALES RATIO: a/ RCU

Districts	b/	I	II	III	Average	F-Value
Gorkha	TCMV	4503 (15)	1455*(25)	660 *+(4)	2422 (44)	8.97*
	CSRT	23.5	18.7	13.8	19.9	1.02
	CSPL	174.0	61.0*	17.5*+	95.6	8.27*
	LSQR	13.4 (18)	27.5 (34)	36.2 (16)	31.1 (68)	.31
Myagdi	TCMV	1900 (10)	1280 (4)	2050 (4)	1796 (14)	.49
	CSRT	21.1	16.7	18.8	19.6	.19
	CSPL	65.1	80.4	70.8	69.8	.13
	LSQR	5.6 (3)	48.5 (3)	52.5 (11)	43.2 (17)	1.61
Mustang	TCMV	2091 (17)	4325 (17)	1670 (4)	3044 (38)	2.69
	CSRT	18.8	24.5	19.5	21.4	.79
	CSPL	302.2	293.8	58.8	272.8	1.75
	LSQR	57.4 (9)	64.1 (12)	60.7 (10)	61.0 (31)	.08

a/ These are average values for the subset of households who report sales of the relevant items. The corresponding number of these households with sales are indicated in parenthesis.

b/ The variable definitions are as follows:

TCMV = total value of crop (and potatoe) sales (rupees)

CSRT = crop sales ratio of TCMV to total crop production (percentage)

CSPL = total crop sales value per ropani of land cultivation (rupees)

LSQR = ratio of total sales of livestock products to total value of livestock production (percentage)

sales value and marketed proportion of household production is not observed. There is no evident basis for arguing that favourable market access increases household production by merely making it feasible to sell off a large volume of farm products. Market access may still affect production significantly. But the mechanisms through which the relationship is established will have to be more indirect, occurring through other location specific variables related to market access. Alternatively, this simple level of bivariate analysis may mask the true relations which in fact does have a direct connection between sales and production.

4.25 The analysis so far has not determined the relationship between market access and production by explicitly incorporating the joint effect of numerous control variables which will affect production in a significant and predictable manner. Part E below analyzes the effect of market access in a multivariate framework where these other control variables are introduced.

E. MULTIPLE REGRESSION ANALYSIS

4.26 Estimation of agricultural production functions for farm/households is a tricky and often irrelevant exercise. The underlying theoretical implications of the regression equations often cannot be justified even when the estimated equations provide a "good fit" of the data or explain a high proportion of the sample variance (high R^2). This study also glosses over most of the uncertainties about what type of production relations are theoretically satisfactory in Nepalese agricultural conditions, and in particular, in the sample districts of the study.

4.27 Household production functions for the study areas have not been previously estimated; so there are few clues about the mutually consistent set of relationships that are important in explaining household differences in farm production (including livestock production). Secondly the estimating equations must be specified in conjuction with some data limitations. The information collected in the household survey - not being a farm management survey - is not complete in terms of all the relevant farm cultivation and livestock input variables. In particular, the details of family labour input actually <u>used</u> in crop and livestock production was not collected. It has also been noted before that the procedure used to compute household production (the dependent variable in the regression equation) is not very precise.

4.28 The set of variables assumed to have independent effect on the level of household production has been classified as follows:[4/]

(a) Asset or other stock variables which measure the productive capacity of the household.

These represent the main control variables, the size of land cultivation (LDCL); the value of livestock holdings (LSV); and the number of family members (more than 10 years of age) whose principal occupation is agricultural production (FMLF). The size of land cultivated may be adjusted by the average cropping intensity (CI) to measure land productive capacity in terms of gross area harvested. Tenancy is not a relevant control variable here because production (unlike income) is measured at the source - i.e. at the level of the cultivating household whether it is a tenant or owner-cultivator.

4/ The names enclosed in parenthesis - e.g. LDCL - are the names assigned to the variables in reporting the regression results in Table 4.8.

sales value and marketed proportion of household production is not observed. There is no evident basis for arguing that favourable market access increases household production by merely making it feasible to sell off a large volume of farm products. Market access may still affect production significantly. But the mechanisms through which the relationship is established will have to be more indirect, occurring through other location specific variables related to market access. Alternatively, this simple level of bivariate analysis may mask the true relations which in fact does have a direct connection between sales and production.

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4/ The names enclosed in parenthesis - e.g. LDCL - are the names assigned to the variables in reporting the regression results in Table 4.8.

(b) Land quality/productivity variables.

Household land quality (LDQ) is measured as an index of the average land grade in terms of the traditional Nepalese categories of abal, doyam, sim, char. Another index of land quality is formulated as the proportion of cultivated land which is irrigated (PIRG). Instead of taking irrigation as another input such as labour or fertilizer, it is better perceived as an intermediary factor which shifts the production function from a lower to a higher productivity phase.5/

(c) Labour supply variables

The availability of family labour as a productive asset of the household is already accounted for in (a) by FMLF. To account for permanent farm servants (hali) - who are quite prevalent in Dang - the total availability of household labour is measured as family labour plus the number of hali's (TLF). Other labour input variables need to be defined in terms of per unit of land cultivated. This is done for family labour (FML2), hired labour (HLF2) and total labour, i.e. hired + family (TLF2). TLF and FMLF only represent labour availability (labour supply) of the household while the hired portion measures actual labour input (labour use) for production. Separate data on labour input for livestock production was not collected.

(d) Other inputs

The total value of purchased inputs for farm production (e.g. seeds, fertilizers, etc.) are aggregated and defined in terms of one ropani of land cultivated (TCPL). FMPL is the amount of farm manure used per ropani. Production credit (CRD) is indicated only as a dummy variable which records whether a particular household has borrowed for production purposes or not within the reference cropping period.

5/ cf. Ishikawa (1967) where such an interpretation of the role of irrigation is derived on the basis of data from several Asian countries.

(e) Household socio-economic characteristics

These include educational status, ethnicity, sex and age of the household head. Female heads of household occurred only in the sample for Mustang (5 cases in total) and so it is not of general relevance. Educational status is initially differentiated only as literate or illiterate (EDU1). Similarly in a particular district only one or two ethnic groups (ETH) who are expected to have different production relations are identified - e.g. Tharu vs. non-Tharu households in Dang; Magar vs. non-Magar in Rolpa.

(f) Technology and management indices

Adoption of improved cultivation practices is indicated as a yes or no dummy variable (IC). A more general index of a household's "management" input (MGI) is defined as a composite index of the following: adoption of improved cultivation; years since adoption; consultation with agricultural technicans in the village; listening to the agricultural program on the radio; and whether the household has increased or improved farm irrigation facilities and agricultural tools and implements in the past three years.

(g) The ratio of the value of crop production to total household production (CRAT). Variation in the relative emphasis given to crop production in comparison to livestock can be an important source of variation in household production. CRAT will vary not only across sample sites - indicating ecological factors - but also within sample households from one location, depending on the relative resource base of each household.

(h) Average local producer prices of crops (CPI).

(i) Finally, dummy variables to distinguish between market access strata. MS1 separates out stratum I from the other two and MS2 separates out stratum II from the others.

4.29 The regression equations are estimated separately for each district. As expected in any estimation of production functions, problems of multicollinearity occur with respect

to important subsets of the variables noted above. Sorting the set of independent variables into different classes as is done above helps to some extent in choosing between the related variables. For instance, one can choose between land quality index and the proportion of land irrigated; but both would not be included in a single equation since they would tend to measure the same thing and be highly correlated with each other. Cropping intensity is also usually correlated with the proportion of land irrigated. The selection among several competing variables can be done in a statistically systematic procedure through a stepwise regression procedure. Unfortunately, this option is not available in the multiple regression computer programme of the SPS statistical package which was used for this study.

4.30 The regression results reported in Table 4.8 are based on selections from 10 to 15 alternative specifications of independent variables. The choice was constrained as follows for all districts:

(a) landsize and the value of livestock holdings are always included as dependent variables because they are the principal control categories.

(b) both of the market access dummies (MS1 and MS2) are included where relevant. Should both coefficients be insignificant, as is the case in Salyan, then either the market access dummies are grouped or one stratum variable is dropped.

(c) all independent variables moderately correlated with the market access variables (the pearson correlation coefficient exceeding 0.3) are forced in the regression to avoid their effect being captured by the market access variables. Such variables are dropped only

when their regression coefficients are significant in a theoretically implausible manner.6/

(d) only one independent variable is selected from the following subsets which tend to measure the same thing or are usually highly correlated. PIRG, CI, and LDO (land quality measures); IC and MGI (technological adoption and management indices); FMLF, TLF, HLF (labour stock/use variables); FML2, TLF2, HLF2 (labour stock/use per ropani of land).

4.31 Two different functional forms were tried: 1) linear in the nominal values; and 2) a combination of the linear and semi-logarithmic form where household production (HQV) and livestock value (LSV) are measured in logarithms while the others are in nominal value.7/ In every district the second functional choice provided the better fit.

4.32 The regression coefficients for Rapti are reported in Table 4.8A. Both the dependent variable and the value of

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6/ This exception also occurs in the case of Salyan. CPI (the price index) is correlated with MS2 (simple r = 0.33). But the inclusion of CPI in the reported equations yields a significantly negative price coefficient, which is theoretically implausible.

7/ Taking logarithms reduces the sample variance on HQV and LSV whose variance otherwise can be very high compared to the other independent variables. When HQV is measured in logarithms it would be more appropriate to measure LSV also in logarithms. But in several districts many households do not own any livestock and so log LSV cannot be defined. Rather than drop these households from the regression analysis, the nominal value of LSV is used in the regression.

livestock holding are measured in logarithms in four districts; only in Rolpa the latter is expressed in nominal value. Two equations are reported for Salyan because both MS1 and MS2 together are not statistically significant (Eq. a). Dropping MS2 - i.e. considering the effect of stratum I in relation to both of the other two strata - makes MS1 significant at the 5% level (Eq. b). The proportion of the variance explained by the equations (R^2) is moderately high for Dang (69%), Pyuthan (74%) and Rukum (65%). The R^2 is slightly lower in Salyan and Rolpa (55% in both)

4.33 Four variables are systematically significant in the expected direction in each of the five Rapti districts. These are land size (LDCL) livestock value (lnLSV or LSV); the proportion of land irrigated (PIRG); and an index of the household management input (MGI; except for Rolpa where CI alone gives a better fit). Each of these variables has a positive effect on household production.

4.34 An ethnic dummy variable is significant in four districts, with the exception of Dang. The ethnic dummy variable for Dang was defined in terms of the major distinction between non-Tharu and Tharu households (57% of the total sample are Tharus); but this coefficient was not statistically significant. Brahmin, Thakuri and Chhetri (B/C/T) households are shown to have a higher average production in Rukum and Pyuthan. In Rolpa, the ethnic dummy variable defines Magar households. In Salyan it defines the (untouchable) professional castes. In these cases the expected effect on production is negative which is the result that is obtained.

4.35 Family labour force (FMLF) is positively significant in three districts - Salyan, Rolpa and Rukum. Direct costs of cultivation per ropani (TCPL) is also correlated with production in Rukum (where it is significantly positive) and Pyuthan (where, however, the coefficient is not statistically different from zero). Only in Dang none of the labour force variables nor the per ropani cultivation cost is significant.

4.36 Average producer price (CPI) is included only in the Pyuthan regression where its coefficient is positive but not statistically significant at the 5% level. A lesser degree of significance occurred in Dang (unreported). But in the other three districts (Salyan, Rolpa and Rukum) CPI is significantly negative - i.e. the effect of higher prices is to lower household production. This is a theoretically implausible response in the estimation of a production (supply) function; and so CPI has been dropped from these equations.[8/]

4.37 As for the other variables, education does not have an independent effect in any of the Rapti districts. This

8/ Die-hard adherents of the perverse supply response hypothesis in subsistence agricultural may find some glimmer of hope in the negative coefficients of CPI. In the present context, the most plausible explanation, however, is that CPI captures the physical setting and high transportation costs of remote undeveloped sites in the Rapti sample. These sites have both lower production due to other factors but are associated with high producer prices because they reflect high transportation (or even hunger) premiums. Secondly, CPI is a very crude aggregration of average producer prices (see Chap. VI. sec. A); so the correlation may be superious.

is an unexpected result. It appears that the effect of education is disguised by the degree of multi-collinearity with the other independent variables, including market access. The proportion of total production derived from farm cultivation (as opposed to livestock production) is statistically significant in two instances. In Rukum the coefficient is negative, indicating higher production is associated with a greater emphasis on livestock production. The reverse association occurs in Dang where a higher proportion of crop cultivation boosts total farm production.

4.38 The regression coefficients for the RCU districts are indicated in Table 4.8 B. The proportion of variance explained by the regression equations are moderately high in Gorkha (70%) and in Mustang (69%). The poorest fit occurs in Myagdi where the R^2 is 56%, with only five independent explanatory variables. The coefficients of land size and the value of livestock holdings are significant and of the expected sign in all three instances. Average local prices (CPI) also significantly and positively affect household production in all three districts. Such a uniformly positive effect of CPI was not found in the Rapti districts. The coefficients for the land quality (LDO) variable is significant in Myagdi. In Mustang, it is the cropping intensity variable (CI) which provides a better fit; while in Gorkha, none of the land quality/land augmenting type of variables are significant.

4.39 The availability of family labour (FMLF) has a positive coefficient in Mustang and Gorkha; and it is statistically significant in both cases. The direct cultivation cost per land unit has a significant production increasing effect in

Gorkha as do the households' farm management index in Gorkha and Mustang. Myagdi is the only case where none of the input related variables - FMLF, MGI and TCPL is significant. Ethnicity is also not included in any equation because the major ethnic groups (Thakali vs. non Thakali in Mustang and Myagdi, and the Brahmin/Thakuri/Chhetri families in Gorkha vs. others) is spatially distributed according to market access stratum. Education (literacy) has a significant positive effect in Mustang.

Market Access Effect

4.40 The regression coefficients for the market access dummy variables represent the mean difference in household production which would occur for a group of households that were equivalent in terms of other control variables, but different only in market access (location). The coefficient of MS1 measures the amount of extra production attributable to location in market access stratum I; and the coefficient of MS2 measures the corresponding effect for market access stratum II. The comparison is with the expected average production in market access stratum III.[9/] Both regression coefficients are expected to be positive.

4.41 The expected sign is observed for all the MS1 coefficients in Rapti district. Two of the five MS2 coefficients (in Salyan

9/ Since the dependent variable is measured in logarithms the regression coefficient of MS1 and MS2 do not directly measure the value in rupees of the extra production caused by location in market access stratum I and II. Estimates of these average differences in production are derived by comparing estimates of log HQV at the mean level of the independent variables. These are reported separately in Table 4.9.

and Rolpa) are negative; but both are statistically insignificant (i.e. the hypothesis that these coefficients are equal to zero, implying no independent effect of market access, cannot be rejected in these two case).[10/] Some of the positive coefficients are also not significant at the 90% confidence level. These are MS1 in Pyuthan and MS2 in Dang. Significance at the 95% confidence level is observed for MS1 in Dang and in Rukum (where MS2 is the only relevant market access variable).

4.42 The effect of Market access in Salyan is heightened by comparing only stratum I households to all the remaining cases. By dropping MS2 from the estimating equation (Eq.b), the MS1 coefficient becomes statistically significant at the 90% confidence level. A similar adjustment was tried in Pyuthan but it did not improve the significance of the estimates.

4.43 The final result is that two of the three MS1 coefficients (Dang and Salyan) are statistically significant in the expected manner; two of the five MS2 coefficients are similarly positive and significant (Rukum and Pyuthan). Rolpa is the one district where market access has no independent effect on household production after controlling for the indicated independent variables.[11/]

10/ Significance is measured at the 95% confidence level for a one tailed alternative hypothesis that both MS1 and MS2 are greater than zero. So a t-value of 1.65 or higher rejects the null hypothesis of no effect of market access. At a 90% confidence level, the critical t-value drops to 1.29.

11/ Of course, even in Rolpa market access can affect production by favourably influencing the other independent (control) variables. Such joint interactions are reflected in the multiple regression estimates but they cannot be isolated empirically. A low t-value cannot be taken as a hard and fast indicator that market access has no effect in production when multicollinearity problems occur.

TABLE 4.7

NAME LIST OF POSSIBLE REGRESSION VARIABLES

Dependent Variables		Units
1. HQV	= value of household production	(rupees)
2. lnHQV	= logarithm of HQV	(rupees)
Independent Variables		
3. LDCL	= size of land cultivated	(ropani)
4. LSV	= value of livestock holding	(rupees)
5. lnLSV	= logarithm of LSV	(rupees)
6. CI	= average cropping intensity	(ratio)
7. LDQ	= index of average land quality measured from 0 to 4	(ordinal index)
8. PIRG	= proportion of land cultivated which is irrigated	(ratio)
9. FMLF	= family labour force- i.e., family members aged more than 10 who are principally occupied in farm production	(number)
10. TLF	= FMLF + number of non-family permanent farm workers	(number)
11. HLF	= number of man-days of hired casual labour	(number)
12. FML2, TLF2, HLF2	= labour per ropani of land cultivated: FMLF+LDCL; TLF+LDCL; HLF+LDCL; respectively	
13. TCPL	= direct cost of farm cultivation per ropani of land	(rupees)
14. FMPL	= amount of farm manure per ropani	(dokos)
15. CRD	= production credit in reference period: 1 if taken, 0 if not	(dummy)
16. EDUC	= educational status of household, head: 1 if literate, 0 if illiterate	
17. ETH	= ethnicity of household (values vary by district)	(dummy)
18. IC	= adoption of improved cultivation techniques: 1 if yes, 0 if not	(dummy)
19. MGI	= management input index measured from 0 to 6	(ordinal) index)
20. CPI	= aggregate local producer price for crops	(Rs./pathi)
21. CRAT	= proportion of total household production derived from farm cultivation only	(ratio)
22. MS1	= indicator of market stratum I; 1 if household is in MS I, 0 otherwise	(dummy)
23. MS2	= indicator of market stratum II; 1 if household is in MS II, 0 otherwise	(dummy)

TABLE 4.8 A

HOUSEHOLD PRODUCTION FUNCTION REGRESSION COEFFICIENTS: RAPTI

Dependent Variable = ln HQV (logarithm of household production)

Districts :		Independent Variables													
		LDCL	PIRG	MS1	MS2	ETH	FMLF	MGI	LnLSV	LSV	TCPL	IC	CPI	CRAT	HLF2
SALYAN (n = 188)	a)	.0007*	.394*	.132	-.04	-.282*	.048*	-.75*	.264*						
Const. = 7.219*		(3.33)	(2.8)	(1.47)	(0.5)	(2.73)	(3.72)	(2.32)	(5.1)						
R^2 =.55 F=27.4		-	-	-	-	-	-	-	-						
Const. = 7.196*	b)	.0007*	.395*	.151*		-.27*	.048*	.078*	.265*						
R^2 =.55 F=31.4		(3.3)	(2.82)	(1.86)		(2.69)	(3.7)	(2.46)	(5.15)						
RUKUM (n = 147)															
Const. = 7.371*		.019*	.371*		.157*	.212*	.068*	.14*	.334*		.0001*			-.08*	
R^2 =.56 F =29.5		(6.32)	(2.94)		(1.76)	(2.33)	(3.49)	(5.32)	(6.03)		(2.12)			(3.57)	
ROLPA (n = 187)															
Const. = 7.569*		.02*	.547*		-.023	-.161*	.037*			.037*		.21*			.073*
R^2 =.55 F =27.8		(5.02)	(3.73)		(0.3)	(2.4)	(2.53)			(6.8)		(2.02)			(3.56)
PYUTHAN (n = 161)															
Const. = 5.394*		.021*	.461*	.039	.119	.124*		.109*	.377*				.183		
R^2 =.73 F = 52.7		(6.39)	(3.83)	(.33)	(1.39)	(1.66)		(4.19)	(7.7)				(1.55)		
DANG (n = 256)															
Const. = 6.738*		.005*	.262*	.253*	.136			.087*	.479*					.08*	
R^2 =.69 F = 79.7		(7.08)	(2.75)	(2.45)	(1.22)			(3.45)	(9.56)					(3.62)	

n is the number of cases (households) in the regression equation.

Figures in parenthesis indicate the respective t-values. The starred (*) values indicate the regression coefficient is significant at the 5% level. Except for CRAT the t-tests for significance of the coefficients are one-tailed tests because one can hypothesized about the direction of the expected relationship in formulating the alternative hypothesis.

Except for the ethnic variable (ETH) all other variables are as defined in Table 4.7. The ETH dummy codes vary with district as follows: ETH = 1 represents Tharus in Dang; Magars in Rolpa; (untouchable) professional castes in Salyan; and Brahmin, Thakuri/Chhetri in Pyuthan and Rukum.

TABLE 4.8 B

HOUSEHOLD PRODUCTION FUNCTION REGRESSION COEFFICIENTS: RCU

Dependent Variable = ln HQV (logarithm of household production)

Districts:

	Independent Variables												
	LDCL	MS1	MS2	FMLF	MGI	CP1	lnLSV	LSV	TCPL	LDQ	EDUC	CRAT	CI
GOI KHA (n = 220)													
Const. = 6.573*	.014*	.671*	.349*	.026*	.12*	.144*	.345*		.002*			-.09*	
R^2 = .70 F = 55.8	(6.15)	(6.52)	(3.67)	(2.5)	(4.59)	(3.76)	(6.96)		(3.56)			(4.1)	
MYI GDI (n = 179)													
Const. = 6.116*	.013*	.297*	.22*			.074*		.071*		.177*			
R^2 =.56 F =36.9	(8.03)	(2.55)	(2.22)			(2.76)		(8.68)		(3.44)			
MUSTANG (n = 149)													
Const. = 3.257*	.033*	.258*	.654*	.052*	.077*	.232*		.06*			.239*		.04*
R^2 =.69 F =33.7	(6.05)	(2.21)	(4.88)	(1.95)	(3.18)	(2.82)		(3.18)			(2.75)		(4.96)

Figures in parenthesis indicate the respective t-values. The starred (*) values indicate the regression coefficient is significant at the 5% level. Except for CRAT the t-tests for significance of the coefficients are one-tailed tests because one can hypothesized about the direction of the expected relationship in formulating the alternative hypothesis.

All variables are as defined in Table 4.7.

n is the number of cases (household) is the regression equation.

In the RCU areas, all six of the market access coefficients are positive and statistically significant at the 95% confidence level. This is a very strong result. Each of the two favourable market access stratum has a separate independent production-increasing effect.

4.44 The values of the regression coefficients of MS1 and MS2 represent the "elasticity" of household production with respect to market access.[12/] They measure the percentage increase in household production in comparison to the average value in stratum III. The elasticity estimates can also be converted to the average effect (in rupees) on household production that can be attributed to market access, holding everything else constant. These values represent the average increase in household production which would be observed if the stratum III households (given their average characteristic on all the relevant independent variables) were located instead in market stratum II or stratum I.

4.45 The highest market access elasticity observed in the district samples is 0.67 in MS I of Gorkha. The effects of location in stratum I of Gorkha is to increase household production by 67% in comparison to stratum III location. Stated in an alternative way, stratum I location increase household production by Rs.2837 on average which is 67% of the mean level of production of Rs.4229 in MS III for the set of households included in the

12/ The usual meaning of elasticity (the % change in variable x due to an unit percentage change in variable y) implies that the independent variable (y) is also a scalar variable. An analogous interpretation of the effect of a discrete (dummy) variable, such a MS1 and MS2, can also be made. These variables take on value of 0 and 1 only, which represents the unit change in the independent variable. Since the dependent variable (household production) is measured in logarithms, these unit changes represent elasticity.

regression equation of Gorkha.[13] Table 4.5 also shows that the actual observed difference in household production between MS I and MS III in Gorkha is Rs.5981 (i.e. Rs.9923 - Rs.3942). Therefore, market access alone accounts for about 47% of this observed difference - i.e. for Rs.2837 out of Rs.5981. The remaining proportion of the higher production in MS I is due to differences on the other independent variables.

4.46 The market access elasticity estimates for the other districts is significantly lower than the two high values of 0.67 for MS I in Gorkha and 0.65 for MS II in Mustang. The sample districts can be classified into four groups on the basis of the range of the elasticity estimates. They are as follows: (the market access elasticity is noted in parenthesis with the MS I value preceeding the MS II value when both are defined).

High value	Gorkha	(.67, .35)
	Mustang	(.26, .65)
Middle value	Myagdi	(.30, .22)
	Dang	(.25, .14)
Low value	Rukum	(.16)
	*Salyan	(.15)
	Pyuthan	(ns, .12)
No effect	Rolpa	(ns)

ns implies the market access elasticity is not statistically different from zero at the 90% or high level of confidence.

* The Salyan estimate represents the effect of MS I compared to the pooled sample of MS II and MS III households because the MS2 dummy is dropped from the regression equation.

13/ The mean household production in MS III of Gorkha in the regression equation (Rs.4229) is slightly different from the MS III sample mean reported in Table 4.5 which is Rs.3943. This difference occurs because not all 252 sample households are included in the regression. Cases with missing observation on any single dependent variable have to dropped from the regression data set. Consequently, the regression means for each stratum varies from the ones reported in Table 4.5. Since only a few cases are dropped in any of the districts, these differences are not very substantial.

4.47 The conversion of these elasticities to the average nominal increase in household production expected in MS I and MS II, together with the appropriate percentage comparisons, are noted in Table 4.9. In each instance, the derivation and inference is equivalent to the illustration with Gorkha noted above. The largest absolute increase in production of Rs.3795 per household occurs in MS II of Mustang in comparison to the base level of production in stratum III. Location in stratum II in Mustang accounts for 33.8% of the observed sample difference in household production. The corresponding figures for MS I in Mustang are lower: Rs.1497 per household which accounts for 27.9% of the observed difference between MS I and MS III.

4.48 Table 4.9 shows that the effect of market access is to increase household production by a substantial proportion even though the actual observed levels of production in the sample households are higher in the less favourable market access locations. For instance, the observed income in MS II of Rukum is less by Rs.1137 than in MS III. This is to be attributed to a non-uniform distribution of control variable characteristics between the two strata. Holding all these factors constant (at the average level of the MS III households), the effect of location in stratum II is to increase production by Rs.1014 per household. This is a 15.3% increase in expected production. Similarly, the effect of location in MS II of Pyuthan is to increase household production by Rs.621 even though the observed sample production is higher in MS III by Rs.740 [14/] In the other two instances where the

14/ A similar explanation is applicable in Myagdi. Here the difference in household production observed in the sample is not in the opposite direction as in Rolpa. But it is less that what would occur if the sample households were equivalent on the other control variables. The increase due to favourable market location is <u>higher</u> than the actual observed difference in the sample.

TABLE 4.9

EFFECT OF MARKET ACCESS ON HOUSEHOLD PRODUCTION

Districts	Strata Comparisons (MS)	Observed Difference in Household Production a/ (Rupees)	Difference due to Market Access b/ (Rupees)	Column 4 as a Percentage of Column 3	Column 4 as a Percentage of Mean Production in MS III c/
1	2	3	4	5	6
Dang	I vs. III	8,141	1808.6	22.2	26.2
	II vs. III	5,738	972.2	16.9	14.1
Salyan	I vs. II+III	1,333	523.7	39.3	15.1
Pyuthan	I vs. III	-191	n.s.	-	-
	II vs. III	-747	740.2	*	12.1
Rolpa	II vs. III	-252	n.s.	-	-
Rukum	II vs. III	-1,137	1014.4	*	15.8
Gorkha	I vs. III	5,981	2837.4	47.4	72.0
	II vs. III	4,059	1475.8	36.4	37.4
Myagdi	I vs. II	1,176	1484	*	30.8
	II vs. III	717	1099.4	*	22.8
Mustang	I vs. III	5,367	1497.2	27.9	25.7
	II vs. III	11,240	3795.2	33.8	65.2

a/ The difference in the mean level of household production between market access strata as indicated in Table 4.5.

b/ This is given by the elasticity of the market access coefficient evaluated at the mean level of production in MS III in the regression data set - i.e. MS1 or MS2 multiplied by the mean level of HQV in MS III in the regression equations reported in Table 4.8.

c/ This is the percentage with respect to the mean level of production (HQV) in MS III as reported in Table 4.5 This percentage in column 6 varies marginally from the value of the MS1 or MS2 elasticity because several households which had missing observations on one or more dependent variables were dropped from the regression estimation data set.

n.s. = statistically not different from zero.

* implies that the relevant percentage in column 5 is not meaningfully defined because the effect of market access (col.4) exceeds the total difference in col. 3 (including cases where the observed difference in col. 3 is negative- i.e. in the opposite direction of the effect of market access).

observed difference in average production is not consistent with stratum location (MS II in Rolpa and MS I in Pyuthan), the effect of market access is insignificant.

4.49 In summary, the multiple regression results reported in Table 4.8 support the hypothesis that market access favourably affects household production in seven of the eight districts. The observed effect is statistically significant in Dang, Rukum and all of the RCU districts. A somewhat weaker evidence for the effect of market access is seen in Salyan (where the effect is limited to stratum I) and in Pyuthan (where it is limited to stratum II). Rolpa is the odd case where the market access distinction shows no independent effect on household production.[15/] The effect of favourable market location is observed to be as dramatic as a 67% increase in household production. The most favourable increase in production is found in Dang and in the RCU districts. In each of these cases, at least one of the market access location leads to a minimum of a 20% increase in production. The corresponding increase in Rukum, Salyan and Pyuthan are in the 12 to 16% range.

15/ The two sample sites identified to have better market access are Liwang, the district HQ, and Khungri on the road to Ghorahi. Additional regressions were run which looked at the market access effects on the Liwang sample only (in comparison to all other Rolpa sample sites). The market access coefficient for Liwang was also insignificantly negative.

CHAPTER - V

MARKET ACCESS AND HOUSEHOLD INCOME

5.1 The following categories and definitions of household income are used for analysis:

1) Primary farm production income (PFPY)

This is computed as the total value of gross household production (HPV) minus all costs of cultivation met from non-family resources. Some adjustments are made for losses due to storage and for seed rates in the gross quantities of crop production.

2) Other productive income (OIPY)

It represents the sum of other income derived from agricultural as well as non-agricultural non-farm sources (items (i) and (ii) defined in paragraph 2.9).

3) Income from pensions and remittances (PRY)

These items represent sources of income not related to current production activities of the household. They are merely transfer payments received by the household.

Aggregate income measure:

4) Household activities income (HAY which is PFPY + OIPY)

This represents total household income derived from current production activities. It can be taken as the net return to the family from all household economic enterprises.

5) Total household income (HTY which is HAY + PRY)

It measures total household income from all sources including non-productive transfer payments.

Cash component measures:

6) Cash revenue from primary farm production (PGCR)

It measures the gross cash revenue generated from

sales of crops, livestock products, fruits and vegetables, and 20% of live animal sales.

7) Household activities cash income (HACY)

This is net cash income from all productive household activities. It is the sum of FGCR and the cash component of other productive income (OTPY) minus all input purchases made in cash.

5.2 From the perspective of studying the effects of market access on household income, the income earned from pensions and remittances (PRY) is not relevant. The estimates of total household income which include these items are reported mainly for completeness of the data. From an analytical point of view, income from primary farm activities (PFPY) and household activities income (HAY) are more significant. Market access should positively affect both of these latter two categories of income. The effect of market access should also be evident in the cash component of household income. One would expect not only higher cash revenues (from sales) but also a higher degree of monetization - i.e. a higher proportion of cash income in total household activities income - in areas with more favourable market access.

A. HOUSEHOLD INCOME AND ITS COMPONENTS

(i) Primary farm production income (PFPY)

5.3 The average level of household income from primary farm production is reported in Table 5.1. This income represents the net receipts on household production which accrue to the cultivating family as disposable income after deducting all direct purchased costs of cultivation. For tenants, the

rental share paid out is subtracted from household production, while for landlords, the rental income received is added.[1/]

5.4 Given the self-sufficiency orientation of small holding agriculture in the study region, the expenditures on purchased inputs for both crop and livestock production are expected to be small. Consequently, the distribution of primary household income will closely follow that of total household production (HQV). This is indeed the case as Table 5.1 indicates. PFPY is almost always more than 80 percent of HQV. There is a slight tendency for this proportion to increase in MS II and MS III, implying that, proportionate to production, the cost of cultivation is smaller in areas with less favourable market access.

5.5 These income adjustments made in total household production are not large enough to alter either the inter - district or inter-stratum ranking of average primary farm production income. This income is still highest in Dang (Rs.8,738 per household) followed by Mustang (Rs.8,404). The other Rapti districts in sequence are Rukum (Rs.5,529), Pyuthan (Rs.5,093), Rolpa (Rs.4,329) and Salyan (Rs.3,395). In the RCU area, Gorkha (Rs.6,463) is second after Mustang, and Myagdi has the lowest income of Rs.4,780 per household. The inter-stratum

1/ In addition to the adjustments for rental income, PFPY is computed by subtracting the following items from gross household production 1) all in-kind payments for wages, credit etc., 2) seed and storage losses, 3) expenditures for purchased inputs: hired labor, hired bullocks, fertilizer, etc. Land revenue and other tax items have not been deducted.

TABLE 5.1

PRIMARY FARM INCOME (PFPY) AND PRODUCTION (HQV): RAPTI

(in Rupees)

Districts	Income/production	MS I	MS II	MS III	Average	F-value
Dang	PFPY	11494	9436	5610*+	8788	3.51*
	HQV	15055 (76.3)	12652 (74.6)	6914*+ (81.2)	11408 (77.0)	9.71*
Salyan	PFPY	3970	3354	3021	3395	n.s.
	HQV	4960 (80.3)	3796 (88.3)	3468* (87.1)	3987 (85.1)	,,
Pyuthan	PFPY	4740	4664	5703	5093	,,
	HQV	6049 (78.3)	5494 (84.9)	6241 (91.4)	5919 (86.1)	,,
Rolpa	PFPY	-	4242	4412	4329	,,
	HQV	- -	4551 (93.2)	4803 (91.9)	4680 (92.5)	,,
Rukum	PFPY	-	4709	5987	5529	,,
	HQV	- -	5281 (89.2)	6417 (93.3)	6010 (91.9)	,,
RCU						
Gorkha	PFPY	8693	7119	3453*+	6463	13.26*
	HQV	9923 (87.6)	8002 (88.9)	3943*+ (87.6)	7327 (88.2)	14.71*
Myagdi	PFPY	5072	5032	4316	4780	n.s.
	HQV	5997 (84.6)	5538 (90.8)	4821 (89.5)	5393 (88.6)	
Mustang	PFPY	9045	13771*	4132*+	8404	25.10*
	HQV	11192 (80.8)	17055 (80.7)	5824*+ (71.8)	10644 (79.0)	27.07*

Figures in the parenthesis indicate the ratio of primary farm income to total production (PFPY/HQV)

PFPY = income from crop and livestock production plus sales of fruit and vegetables.

HQV = total production of crops, livestock and sales of fruit and vegetables.

n.s = not statistically significant.

differences in PFPY also closely follows that of total production. A systematic relation with favourable market access is observed in Dang, Salyan, and each of the RCU districts. The difference is most extreme and statistically significant between MS I and MS III in Dang (a difference of Rs.5,384), in Gorkha (a difference of Rs.5,240) and between MS II and MS III in Mustang (a difference of Rs.9,589). On the other hand, in Pyuthan, Rolpa and Rukum, primary farm production income is higher in MS III; but none of the inter-stratum differences are significant.

(ii) Other productive income (OTPY)

5.6 Other net income from farm and non-farm sources is also expected to be associated positively with market access. Market access should make ancillary household enterprises such as cottage industry type production or other home processing activities both feasible and profitable. Even agricultural wage employment earnings can be expected to be higher. If market access stimulates extra production, it should also increase the demand for factor inputs, including that of farm labour. Non-farm employment prospects should also be better in areas with a higher concentration of population and in the administrative centers that were selected for the stratum I sample sites. The expected relationship between market access and other income, however, can be lessened by differences in occupational pattern and sources of income related to ethnicity and other location-specific variables.

5.7 Information on the number of sample households who report any income from these other sources and their average income

TABLE 5.2 A

AVERAGE OTHER INCOME (OTHY): RAPTI

Districts/ Strata	Sample Size	No. with Other income	Chi-Square	Average Other Income (Rs.)1/ A	B	F-value2/
Dang						
I	108	82 (75.9)		5540	4207	a) 5.73*
II	59	35 (59.3)	6.86*	4135	2453	b) 8.27*
III	104	64 (61.5)	(DF=2)	2364* +	1455*	
Total	271	181 (66.8)		4146	2769	
Salyan						
I	53	46 (86.8)	16.7*	5691	4939	a) 6.18*
II	69	39 (56.5)	(DF=2)	2131*	1204*	b) 13.58*
III	74	40 (54.1)		3685*+	1992*	
Total	196	125 (63.8)		3938	2512	
Pyuthan						
I	59	41 (69.5)	33.53*	3212	2232	a) 3.65*
II	57	37 (64.9)	(DF=2)	5557	3607	b) 9.71*
III	74	18 (24.3)		1650 +	401+	
Total	190	96 (50.5)		382[illegible]	1932	
Rolpa						
II	97	39 (40.2)	n.s.	4739	1905	n.s.
III	101	45 (44.6)		2363	1055	,,
Total	198	84 (42.4)		3469	1472	
Rukum						
II	53	35 (66.0)	n.s.	3965	2619	a) 4.23*
III	95	48 (50.5)		1857+	938+	b) 7.04*
Total	148	83 (55.1)		2746	1540	
RAPTI TOTAL						
I	220	169 (76.8)	50.41*			
II	335	185 (55.2)	(DF=2)			
III	448	215 (48.0)				
Total	1003	569 (56.7)				

1/: 2/: See footnotes on Table 5.2 B.

TABLE 5.2 B

AVERAGE OTHER INCOME (TPY): RCU

Districts/ Strata	Sample Size	No. with Other Income	Chi-Square	Average Other Income (Rs.) 1/ A	B	F-value 2/
Gorkha						
I	72	47 (65.3)		3517	2296	n.s.
II	104	47 (45.2)	7.35*	3847	1738	,,
III	76	37 (48.7)	(DF=2)	2424	1180	
Total	252	131 (51.9)		3327	1729	
Myagdi						
I	49	21 (42.8)		2083	892	n.s.
II	72	34 (47.2)	n.s.	2675	1282	,,
III	70	31 (44.3)		3231	1590	
Total	191	86 (45.0)		2731	1284	
Mustang						
I	62	58 (93.5)	7.34*	6447	6031	a) 5.24*
II	39	30 (76.9)	(DF=2)	4084*	3142*	b) 7.05*
III	59	54 (91.5)		4287	3924*	
Total	160	142 (88.8)		5126	4550	
RCU TOTAL						
I	183	126 (68.9)	12.17*			
II	215	111 (51.6)	(DF=2)			
III	205	122 (59.5)				
Total	603	359 (59.5)				

Figures in parenthesis are percentages with respect to the sample size.

1/ This is any other income from farm and non-farm sources apart from primary farm production income (PFPY).
Average OTPY under A is the average value of the sub-sample of households who report some other income, while the average under B is for the entire stratum sample. The Chi-Square statistic tests whether the proportion of households with non-zero other income is related to market access.

2/ The reported F-Statistics test for significant differences in mean level of other income among those households who report any such income (items a) and for the entire stratum sample (item b), respectively.

per household is reported in Table 5.2. Because many households may not report any other income besides primary farm income, the effect of market access should be analyzed in terms of both of these categories: the proportion of households with income from other sources; and the average income among these households (i.e. excluding the cases with zero other income).

5.8 At the district level the highest proportion (89%) and the highest average other income (Rs.5,126) occurs in Mustang. This result is to be expected because of Mustang's relatively more developed trading orientation. Comparing the three strata in Mustang, the highest proportion as well as the highest average income (Rs.6,447) is reported in MS I; but the corresponding lowest proportion and average is in MS II rather than in MS III. Market access related differences in other income is also observed in Gorkha. The proportion of households with such income is highest in MS I (65%) compared to the 45% and 49% in MS II and III, respectively. For these households the average income, however, is slightly higher in MS II; but the three strata means are not significantly different. In Myagdi the proportion of households with other income is uniform in each stratum, varying from 43% to 47%. Here also none of these stratum differences in other income are statistically significant.

5.9 The relationship between market access and other household income is more clearly observed in Rapti. The proportion of households who report other income is almost always higher in the more favourable market access areas. Of the eight possible pairwise comparisons (3 between MS I and MS II and 5 between MS II and MS III), seven are in the expected

direction. The exception is Rolpa where the difference is slight - 45% in MS III and 40% in MS II. The average income for these households is also positively related to market access. The average other income is the lowest in MS III by more than 50% in comparison to the average of MS I in Dang and Pyuthan and of MS II in Rolpa and Rukum. In Salyan the average income in MS I (Rs.5,691) is significantly higher than in MS III (Rs.3,685). Salyan differs from the other Rapti districts only because the average amount of other income is even lower in M S II (Rs.2,131). Such a break in the trend also occurs in Pyuthan where the average income in MS II (Rs.5,557) is higher than in MS I. This represents the effect of Khalanga, the district capital of Pyuthan, which is classified in stratum II.

5.10 To summarize, the expected favourable effect of market access on other sources of household income is clearly seen in the sample districts. Both the proportion of households who report any such income as well as the average amount of this income tends to increase with favourable market access. The relationship is very strong in the Rapti districts, where such income varies by more than a factor of 2 among different market access strata. The observed differences are statistically significant for all districts except Rolpa. In the RCU zones, the expected relationship is also seen in Gorkha and Mustang; but it is less systematic than in the Rapti districts. Myagdi is the lone case where the observed differences are not in the expected direction. Average other income is highest in MS III (though these differences are not statistically significant). It is worth noting that Myagdi is the district with both the lowest proportion of households who report other

income (45%) and the lowest average level of income (Rs.2,731). The proportion of households with other income always exceed 50% in the other districts. In these cases where other income plays a relatively more important role, the effect of market access is as expected.

5.11 The breakdown of the amount of other income into an agricultural and non-agricultural component is reported separately in Tables 5.3A and B. The agricultural component of other income measures only income derived from agricultural wage earnings and rentals of bullock and of other agricultural implements. The proportion of households who report some agricultural other income varies in a small range from 15% to 26% of the district samples, excepting Dang. The comparatively large average size of land cultivation (and a different agrarian structure) makes agricultural labouring and rentals an important source of income in Dang. About 40% of households report this source of income with an average earning of Rs.1826. The average earning in all the other districts is lower, though Salyan is surprisingly a close second at Rs.1,653 per household.

5.12 Looking at inter-stratum variations, the proportion of households who report agricultural income is statistically related to market access only in Pyuthan and Mustang. In the former case, this proportion is higher in the more favourable market access strata. The relation is reversed in Mustang: the higher frequency is observed in MS III (27%) as opposed to only 8% in MS I.[2/] The average value of agricultural

2/ The MS I households of Mustang (Jomsom and Marpha) concentrate more on non-agricultural sources of income. As indicated in Table 5.2D, more than 85% of these households report such income while the corresponding proportion in MS II and MS II are 68% and 75% respectively.

DISTRIBUTION OF HOUSEHOLDS WITH OTHER INCOME FROM AGRICULTURAL AND NON-AGRICULTURAL SOURCES: RAPTI[1]

Districts	Market Strata	Sample Size	Number of household with Other Income From: Non-agri.	Number of household with Other Income From: Agri.	Chi-Square[2]	Average Value of Other Income From (in Rupees): Non-agri.	Average Value of Other Income From (in Rupees): Agri	F-value[2]
Dang	I	108	45 (11.7)	45 (41.7)	a) 6.1*	8933	1163	a) 9.67*
	II	59	14 (23.7)	25 (42.4)	b) n.s.	5334	2802*	b) 5.57*
	III	104	32 (30.8)	37 (35.6)	(DF=2)	2447*	1973*	
	Total	271	91 (33.6)	107 (39.5)		6098	1826	
Salyan	I	53	40 (75.5)	9 (16.9)	a) 15.32*	6113	1920	a) 7.7*
	II	69	30 (43.5)	19 (27.5)	b) n.s.	1821*	1498	b) n.s.
	III	74	33 (44.6)	24 (32.4)	(DF=2)	3248*+	1675	
	Total	196	103 (52.6)	52 (26.5)		3945	1653	
Pyuthan	I	59	27 (45.8)	15 (25.4)	a) 38.34*	4211	1200	a) n.s.
	II	57	35 (61.4)	3 (5.3)	b) 8.87*	5783	1057	b) 6.63*
	III	74	8 (10.8)	12 (16.2)	(DF=2)	2875+	558*	
	Total	190	70 (36.8)	30 (15.8)		4844	930	
Rolpa	II	97	24 (24.7)	17 (17.5)	n.s.	7072	888	a) n.s.
	III	101	20 (19.8)	25 (24.8)	"	4680	520+	b) 4.32*
	Total	193	44 (22.2)	42 (21.2)		5985	669	
Rukum	II	53	27 (50.9)	14 (26.4)	a) 4.78*	4474	1286	a) n.s.
	III	95	31 (32.6)	20 (21.1)	b) n.s.	2501	580+	b) 5.6*
	Total	148	58 (39.2)	34 (22.9)	(DF=1)	3419	871	
RAPTI	I	220	112 (50.9)	69 (31.4)	a) 35.53*			
	II	335	130 (38.8)	78 (23.3)	b) n.s.			
	III	448	124 (27.7)	118 (26.3)	(DF=2)	-	-	-
	Total	1003	366 (36.5)	265 (26.4)				

1/ Agricultural other income consists of wage income and rental earning from bullock and other farm implements. Non-agricultural income combines all other household activities and non-farm income source: income from salaries, cottage industry activities, retail trade, seasonal off-farm employment, money lending etc.

2/ The Chi-Square and F-Statistic reported under (a) test for the significance of inter-stratum differences in the mean value of other income from non-agriculture sources and in the average value of income from this source. The corresponding statistics reported under (b) test for a similar significance of the inter-stratum differences on other income from agricultural sources.

earnings is positively associated with market access in Pyuthan, Rolpa and Rukum. The largest relative difference occurs in Pyuthan between MS I (Rs.1200) and MS III (Rs.558) - a difference of more than 115%. Salyan and the RCU areas show no association between the average amount of such earnings and market access. In Dang, average earnings in MS II and MS III are significantly higher than in MS I. But as in the case of Mustang, the MS I households of Dang more than make up for the low agricultural income by a higher incidence and higher average value of non-agricultural income.

5.13 The proportion of households reporting non-agricultural income as well as its average value is relatively higher than other agricultural income in every district. This source of income is reported by about 37% of Rapti households (with the highest value of 53% in Salyan) and 44% of RCU households (with 77% in Mustang). The effect of favourable market access is to increase the incidence of non-agricultural income in all the five Rapti districts and in Mustang. The stratum contrasts are statistically significant in all these districts except Rolpa. In the combined Rapti sample, 51% of the MS I sample report non-agricultural income in comparison to 39% in MS II and 28% in MS III. The corresponding proportion in the RCU sample is 52%, 35% and 46%; but this result as due mostly to Mustang. The association with market access is not seen in Gorkha and Myagdi.

5.14 The effect of market access on the average value of non-agricultural income is also very strong in Rapti. The lowest average earnings are always reported in MS III in all the Rapti districts. The difference is more than double in Dang

TABLE 5.3 B

DISTRIBUTION OF HOUSEHOLD WITH OTHER INCOME FROM AGRICULTURAL AND NON-AGRICULTURAL SOURCES: 1/ RCU

Districts	Market Strata	Sample Size	Number of Household With Other Income From Non-agri.	Number of Household With Other Income From Agri.	Chi-Square 2/	Average Value of Other Income From (in Rupees) Non-agri.	Average Value of Other Income From (in Rupees) Agri.	F-value 2/
Gorkha	I	72	29 (40.3)	19 (26.4)	n.s.	4338	2079	n.s.
	II	104	34 (32.7)	18 (17.3)		4385	1761	,,
	III	76	27 (35.5)	17 (22.4)		2630	1100	
	Total	252	90 (35.7)	54 (21.4)		3843	1665	
Myagdi	I	49	13 (26.5)	13 (26.5)	n.s.	2926	1338	n.s.
	II	72	15 (20.8)	15 (20.8)		3352	1373	,,
	III	70	23 (32.9)	23 (32.9)		4142	1435	
	Total	191	51 (26.7)	51 (26.7)		3568	1392	
Mustang	I	62	53 (85.5)	5 (8.1)	a) 5.04*	6928	1340	a) 5.37*
	II	39	26 (66.7)	9 (23.1)	b) 7.83*	4290*	1220	b) n.s.
	III	59	44 (74.5)	16 (27.1)	(DF=2)	4602*	1813	
	Total	160	123 (76.9)	30 (18.8)		5539	1556	
RCU TOTAL	I	183	95 (51.9)	37 (20.2)	a) 12.19*			
	II	215	75 (34.9)	42 (19.5)	b) n.s.			
	III	205	94 (45.9)	56 (27.3)	(DF=2)			
	Total	603	264 (43.8)	135 (22.4)				

N.B. 1/; 2/: as in Table 5.3 A.

between MS I (Rs.8,933) and MS III (Rs.2,447) and in Salyan (Rs.6,113 vs. Rs.3,248) and in Pyuthan between MS II (Rs.5,783) and MS III (Rs.2,875). Proximity to market centers clearly improves prospects and earnings from non-agricultural sources in Rapti. In the RCU areas, this result is equally strong in Gorkha and Mustang. Only in Myagdi the observed incidence and average value is higher in MS III; but these differences are not statistically significant.

(iii) Total Household Activities Income (HAY)

5.15 The sum of primary farm production income and other income is defined to be household activities income. It represents the sum total of income received for all currently productive household enterprises. (It excludes pension earnings and remittances from long-term migrants). The previous sections have shown that both farm production income and other income were usually related to market access, the latter more uniformly than the former. Naturally a similar relation will occur for their sum (HAY). The result that will be of more significance is whether, in the few cases where farm production income is lower in the more favourable market access strata, the more systematic relation of other income with market access is strong enough to override the former results. The negative relation between market access and farm production income occurs in Rolpa, Rukum, and Pyuthan. Table 5.3 indicates that in all three cases this negative relations is more than compensated for by other income so that total household income is higher in the more favourable market access stratum.

5.16 Looking at all the districts, HAY is always higher in MS I than in MS III. In four of these six cases, the

TABLE 5.4

HOUSEHOLD ACTIVITIES INCOME (HAY)

(in Rupees)

Districts	MS I	MS II	MS III	Average	F-value
Dang	15,700 (45.0)	11,889* (59.4)	7,065*	11,557	10,24*
Salyan	8,909 (55.6)	4,558* (-9.1)	5,013*	5,906	8,4*
Pyuthan	6,973 (87.6)	8,271 (73.8)	6,105+	7,024	n.s.
Rolpa	-	6,147 (88.9)	5,467	5,800	n.s.
Rukum	-	7,328 (94.5)	6,925	7,069	n.s.
Gorkha	10,989 (42.2)	8,858 (52.3)	4,633*+	8,193	12.37*
Myagdi	5,964 (98.1)	6,296 (92.9)	5,853	6,046	n.s.
Mustang	15,075 (73.8)	16,913 (47.9)	8,106*+	12,953	15,53*

The figures in parenthesis for the MS I and MS II columns represent the percentage increase in household activities income in comparison to the level in MS III. (MS II in Salyan shows a relative decrease).

difference in the mean income is statistically significant. Comparing stratum II and III, seven of the possible eight cases show a higher average income in MS II, of which four are statistically significant. Salyan is the exception where average income is higher in MS III than in MS II(but not significantly). Rolpa, Rukum and Myagdi are the districts where the observed differences, though in the expected direction, are not significant.

5.17 It is worth noting that these latter three districts, together with Pyuthan, have relatively lower average household activities income. The district ranking is as follows: Mustang (average income of Rs.12,953 per household), Dang (Rs.11,557), Gorkha (Rs.8,193), Rukum (Rs.7,069), Pyuthan (Rs.7,024), Myagdi (Rs.6,048), Salyan (Rs.5,906) and Rolpa (Rs.5,800). In the last five districts, the difference in household activities income among market access strata is generally not statistically significant. But in the first three districts where average income is relatively higher, the effect of market access is always significant: pairwise t-tests as well as the ANOVA F-value reject the null hypothesis of equal average income in each market access stratum for Mustang, Dang and Gorkha. There is often a more than 100% difference between the average income among the market access strata of a district. For instance, average household activities income in MS III of Dang is only Rs.7,065 in comparison to Rs.15,700 in MS I. In Mustang also the corresponding amounts are Rs.8,106 in MS III and Rs.16,913 in MS II.

5.18 One expects that the effect of market access will be more pronounced in the relatively more prosperous or more advanced districts. When households have sufficient productive resources

under their control, market access can play a more important role in household production decisions with regard to how efficiently household resources are utilized. But when most household are resource-poor, irrespective of their location within a district, then the potential production increasing effect of market access is diminished. These households will tend to be uniformly poor whether they are situated near a market centre or far away from it because market participation and its potential benefits are limited by their poor resource base. Table 5.4 emphasizes the likelihood of such a resource-base related response to market access within both Rapti and the RCU zones.

(iv) Market Access and Sources of Household Income

5.19 The relation between market access and the proportion of household activities income derived from specific sources is indicated in Tables 5.5A and B These proportions very significantly from the relative shares of cash income indicated in the Baseline Survey (noted in Chapter I, Table 1.3 of this report). Everywhere crop production alone accounts for the largest share of total income. This share is generally above 50% except in VS I of Salyan and in Rukum where it falls to a minimum of 46 percent. The share of fruit and horticulture cultivation is negligible - less than 2% even in Mustang.[3/]

3/ The extremly low shares of income from fruit and vegetables is largely due to the fact that only cash sales of fruit and vegetables is taken as income (as was done in the Baseline Survey). But it is unlikely the proportion would increase substantially even if home consumption was measured and taken to be part of income. Livestock income in Mustang does not include earnings from rentals of pack animals, mainly ponies. This is an important source of income in these trading communities but it is more appropriately classified as business income, and so is recorded in other income from non-agricultural sources.

TABLE 5.5 A

PERCENTAGE SHARE OF HOUSEHOLD ACTIVITIES INCOME BY SOURCES: RAPTI

Districts /strata	Average Income (Rupees)	Percentage Share by Source: Crops	Livestock	Fruit/ Veg.	Other agri.	Other non-ag.	Other Total a/	F-value b/
1	2	3	4	5	6	7	8	9
Dang								
I	15700	60.6	14.8	.1	7.2	17.2	24.4	
II	11889	60.7	15.5	0	15.7*	8.4*	24.1	6) 3.7*
III	7065	57.1	18.6	.3	13.1*	11.0*	24.1	7) 3.4*
Total	11557	59.2	16.4	.1	11.3	12.9	24.2	
Salyan								
I	8909	41.7	12.1	.6	4.0	41.8	45.8	3) 12.8*
II	4558	63.8*	17.4*	.2	6.7	12.0*	18.7	4) 6.7*
III	5013	53.9*+	21.4*+	0	7.7	17.1*	24.8*	7) 26.8*
Total	5906	54.1	17.5	.2	6.3	22.0	28.3	8) 15.9*
Pyuthan								
I	6973	59.8	12.6	-	9.2	18.6	27.8	3) 10.3*
II	6271	54.0	18.1*	-	1.0	27.1*	28.1	4) 10.6*
III	6105	71.1*+	23.5*+	-	2.6	3.0*+	5.6*+	7) 19.1*
Total	7024	62.5	18.5	-	4.2	15.1	19.3	8) 21.6*
Rolpa								
II	6147	63.8	21.5	.1	3.6	11.0	14.6	
III	5467	67.8	24.0	0	3.6	4.7+	8.3+	7) 5.8*
Total	5800	65.9	22.8	.1	3.6	7.8	11.4	8) 5.1*
Rukum								
II	7328	46.4	26.9	.1	6.0	20.9	26.9	4) 16.1*
III	6925	48.2	40.0+	.2	2.2+	9.6+	11.8+	6) 5.9*
Total	7069	47.5	35.3	.1	3.5	13.6	17.1	8) 15.0*

a/ Other total represents the sub-total of col. 6 and col. 7.

b/ The reported F-value tests for the significance of observed differences in the stratum means for each of the income categories listed in the corresponding column. The differences are not significant for the column categories not indicated in column 9.

Large variations are observed in the share of the remaining categories - income from livestock production and non-primary farm income from other sources (both agricultural and non-agricultural). Across districts the share of livestock varies from about 14% in Mustang to over 35% in Rukum; while that of other income varies from about 12% in Rolpa to 28% in Mustang and Salyan.

5.20 The pattern revealed by the inter-stratum variation in income shares has already been noted above. The most consistent variation is that other sources of income (apart from primary farm activities) is related to market access. Of its two components - agriculture and non-agriculture income, the favourable effect of better market access is more pronounced on the latter.

TABLE - 5.5B

PERCENTAGE SHARE OF HOUSEHOLD ACTIVITIES INCOME BY SOURCES:RCU

Districts	Average Income (Rs.)	Percentage share by source: Crops	Live-stock	Fruit/ veg.	Other agri.	Other non-ag.	Other total a/	F-Value b/
1	2	3	4	5	6	7	8	9
Gorkha								
I	10989	57.1	22.3	.1	8.8	12.1	20.9	3)4.9*
II	8858	55.5	29.0*	.1	4.5	11.3	15.8	4)5.3*
III	4633	45.8*+	33.5*	0	6.3	14.5	20.8	
Total	8191	53.0	28.4	.1	6.3	12.5	18.8	
Myagdi								
I	5964	69.4	17.4	.2	7.3	5.8	13.1	
II	6296	67.5	15.5	.2	5.3	11.[illegible]	16.9	
III	5853	63.0	17.2	0	8.8	12.7	21.5	
Total	6048	66.4	16.6	.1	7.1	10.4	17.5	
Mustang								
I	15075	40.2	21.2	1.3	2.1	35.8	37.9	
II	16913	70.7	7.4	1.7	3.8	17.0	20.8	
III	8106	67.6	10.5	.2	6.4	15.4	21.8	
Total	12953	57.7	13.9	1.0	4.[illegible]	23.7	27.8	

a/; b/ as in Table 5.5A.

(v) Total Household Income ($_{HTY}$)

5.21 The average amount of income from pensions and remittances (PRY) is likely to be low since they are not a general source of earnings for all households. Consequently, the distribution of total household income including PRY does not differ greatly from the distribution of household activities income discussed above. Nevertheless, this information is reported in Table 5.6 below for the sake of completeness.

5.22 To summarize, the statistical inference on the effect of market access is equivalent whether one considers the effect on household activities income or total household income. The following statistically significant results occur in both cases:

1) household income is progressively higher in MS II and MS I of Dang and Gorkha; and average income in MS I is more than 50% of the level in MS III in both districts.

2) household income in MS III of Mustang is significantly lower than the levels in MS I and MS II (among which the average level is slightly higher in MS II). The ratio of average income in MS III to the other two strata is about 54% and 48% respectively.

3) income is significantly higher in MS I of Salyan than in MS II and MS III. Here too the differences are approximately 50%.

4) average household income in Pyuthan is significantly higher in MS II than in MS III by about 30%. (Average income in MS I is in between, but much closer to the level of MS III than of MS II).

5.23 As for the remaining districts, household income is higher in MS II than in MS III of Rolpa and Rukum. But the

TABLE 5.6

TOTAL HOUSEHOLD INCOME (HTY) AND INCOME FROM PENSION AND REMITTANCES (PRY)

(in Rupees)

Districts	Income	MS I	MS II	MS III	Average	F-value[a]
Dang	HTY	15788	11889	7093*+	11602	7.23*
	PRY	88	0	28	45	
Salyan	HTY	9086	4611*	5040*	5982	8.84*
	PRY	175	52	27	76	
Pyuthan	HTY	7390	8820	6817*	7596	n.s.
	PRY	417	549	712	572	
Rolpa	HTY	-	7133	5692	6398	n.s.
	PRY	-	986	225	597	
Rukum	HTY	-	7592	6958	7185	n.s.
	PRY	-	264	33	116	
Gorkha	HTY	11618	9273	5158*+	8707	12.43*
	PRY	629	415	525	528	
Myagdi	HTY	6295	6802	6537	6575	n.s.
	PRY	331	507	684	527	
Mustang	HTY	15075	16951	8106*+	12963	15.62*
	PRY	0	38	0	9	

a/ The reported F-Statistic tests for equality of means on total household income across market access strata.

differences are small and are not statistically significant. Myagdi is the sole case where total household income in MS III is higher (albeit insignificantly) than that in MS I. Because the average income differences are small, Myagdi also represents the only case where the ranking of stratum households on the basis of total household income is different than for household activities income (which is higher in MS I than MS III).

B. CASH INCOME

(i) Gross revenue from sales of primary farm products (FGCR).

5.24 The sale value of primary farm products consist of the following: (1) sales of all crops and potatoes (2) sales of livestock products, (3) 20% of sales of live animals. The sum of these components which measures the gross cash revenue from primary farm production (FGCR) represents in effect the cash component of total household production (HQV).

5.25 Though market participation is obviously influenced by market access; the average value of sales need not be clearly related to market access. FGCR will depend not only on the level of household production but on the product mix of crop as well as livestock production. We have already noted that average producer prices (GPI) are not correlated with market access. Morever, in view of seasonal price fluctuations, sales revenue will also depend on the timing of sales. Certain products entail some home processing (e.g. ghee) while other (e.g. milk) do not, so differences in unit value occur on this basis also. Finally, there is the old argument that the market sales behaviour of traditional farmers are often guided by a fixed cash requirement. Hence, even small (food-deficit) farmers often sell part of their

produce to generate the required cash income; while on the other hand, the marketable surplus does not increase proportionately to production for the large farmers. Cash income can also be raised from sources other than sales of farm production. So the occupational mix of the sample households will also affect the average sales of farm products whether or not households operate on the basis of a fixed cash requirement.

5.26 The average household revenue from gross sales of all primary farm products is indicated in Table 5.7. In view of the issues raised in the previous paragraph, a consistent pattern between market access and gross sale revenue is not observed. But in the three districts where average incomes are relatively higher (Dang, Mustang and Gorkha), MGCR is lowest in MS III and the range of differences is very large. Gross sale revenue averages Rs.2,067 per household in MS I of Dang and it falls to Rs.1,152 and Rs.499 in MS II and MS III, respectively. In Mustang, the respective stratum averages are Rs.1,065, Rs.2,626 and Rs.253; and Rs.1,032, Rs.482 and Rs.70 per household in Gorkha.

5.27 A systematic pattern in these three relatively more prosperous districts is consistent with the manner in which primary farm production income (PFPY) and total household activities income (HAY) is related to market access. Of the five other districts, a partial corroboration of the favourable effect of market access on gross sale revenues is seen in Myagdi and Rolpa. In Salyan, the average MGCR per household in MS I and MS III are approximately equal, but the lowest revenue is reported in MS II. Rukum is the most blatant

TABLE 5.7

GROSS SALES REVENUE OF PRIMARY FARM PRODUCTS (FGCR)

(in Rupees)

Districts	I	II	III	Average	F-value
Dang	2067	1152	499+	1266	n.s.
	(7)	(8)	(6)	(7)	,,
Salyan	182	99	179	157	n.s.
	(3)	(2)	(2)	(2)	,,
Pyuthan	179	80	220	165	n.s.
	(1)	(1)	(2)	(2)	,,
Rolpa	-	106	59	82	n.s.
	-	(1)	(1)	(1)	,
Rukum	-	302	950+	718	4.25*
	-	(5)	(10)	(8)	3.22*
Gorkha	1032	482*	70*+	515	7.79*
	(5)	(4)	(2)	(4)	3.89*
Myagdi	406	90*	188	207	3.5*
	(4)	(1)	(2)	(2)	n.s.
Mustang	1065	2626*	253*+	1146	10.34*
	(7)	(13)	(3)	(7)	6.59*

Figures in the parenthesis indicate ratio of gross household cash revenue to total production (FGCR ÷ HQV).

The second F-Statistic tests for inter-stratum differences of this ratio.

contradiction of the effect of market access because average sales revenue is more than 3 times higher in MS III (Rs.950) than in MS II (Rs.302).

(ii) Household activities cash income (HACY)

5.28 Household activities cash income is estimated as the sum of the gross sales of primary farm production and net cash income from all other household activities (e.g. wage earning, salary, retail shop-keeping etc.). HACY represents the cash component of household activities income (HAY). Cash income from these other sources is likely to be associated strongly with market access; and often the average value of such income in areas with favourable market access will exceed cash income from sales of primary farm products. The average value of HACY and its share in total household activities income is reported in Table 5.8.

5.29 The average value of total cash income is strongly affected by market access. Gorkha and Mustang in RCU, and Dang, Rolpa and Rukum have a systematic pattern of a higher HACY in each stratum with a more favourable market access. HACY in MS I is about four times higher than in MS III in Gorkha; and the corresponding ratio is three times in Dang. Statistically, the average level of HACY in MS III is significantly lower than the MS II and MS I (if relevant) levels in four of the eight districts - Dang, Gorkha, Pyuthan and Rolpa. Such a systematic, statistically significant effect of market access has not been usually observed for the other production and income variables. In Mustang, HACY in MS III is significantly less than in MS I but not than in MS II. Partial evidence for the effect of market

access is also observed in Salyan: the expected difference between MS I and MS III is statistically significant though HACY is higher in MS III than in MS II. It is only Myagdi (as on other occasions) where there is no evidence for the positive impact of market access on the average level of sales revenue. HACY is higher in MS III than in MS II, and also higher in MS II than in MS I - the exact reversal of the expected effect of market access. But these differences are not statistically significant.

5.30 Table 5.8 also shows that the proportion of household cash income to total household activities income tends to be higher is MS I and MS II than in MS III. This ratio can be taken as a measure of the importance of market exchanges in the total income position of the household; or alternatively as an approximate indicator of the degree of monetization.[4/] At the district level of comparison, this ratio varies from about 34% in Mustang to a low of 10.2% in Rolpa. It is surprisingly high in Myagdi (19.2% in comparison to 13% in Gorkha) and Rukum (24.9%). The strata differences are most extreme in Salyan: 43% of household activities income in MS Iaccrues in the form of cash in Salyan while the corresponding proportion in MS II and MS III are 19% and 26.8%, respectively.

5.31 In the Rapti districts the cash proportion of household activities income is generally higher in areas with a better

4/ This is only a partial measure of monetization because it does not consider cash exchanges for household purchases of farm inputs and family consumption items.

market access. Only Dang does not clearly hold to this pattern. Monetization in MS III of Dang is slightly higher than in the other two strata. Perhaps Dang is the exception because commercial relations (even in the remote regions of the district) are more developed than in the Hill districts. As for the RCU districts, the cash proportion steadily falls from MS I to MS II in Gorkha and Mustang; while Myagdi is the exception again, though with very small differences among strata.

TABLE - 5.8

AVERAGE HOUSEHOLD CASH INCOME (HACY): TARAI AND RCU

(in Rupees)

Districts	MS I	MS II	MS III	Average	F-value
Dang	6109 (23.2)	3341* (25.4)	1920*+ (30.1)	3399 (28.7)	7.3* n.s
Salyan	4623 (43.7)	1280* (19.2*)	2166* (26.8*)	2518 (28.7)	10.5* 12.5*
Pyuthan	2042 (24.9)	3390 (24.0)	332*+ (4.3*+)	1780 (15.6)	8.3* 17.2*
Rolpa	- -	1916 (13.9)	322+ (5.7+)	1103 (10.2)	3.9* 7.9*
Rukum	- -	2921 (31.3)	1910 (21.3+)	2272 (24.9)	n.s 5.9*
Gorkha	2726 (20.7)	1820 (14.8)	684*+ (3.4*+)	1736 (13.0)	5.7* 5.7*
Myagdi	1223 (16.9)	1354 (18.3)	1716 (21.7)	1453 (19.2)	n.s n.s
Mustang	7096 (43.2)	5755 (33.6)	4177* (24.2)	5693 (33.9)	4.6* n.s

Figures in the parenthesis indicate ratio of average household cash income to total household activities income (HACY/HAY). The second F statistic tests for significant differences of this ratio.

CHAPTER - VI

PRICES, MARKETING PROBLEMS AND RESPONSE TO MARKET ACCESS

A. MARKET ACCESS AND PRODUCER PRICES

(i) Crop specific producer prices

6.1 The relationship between market access and aggregate crop producer prices (CPI) at the level of the different market access strata in a district was noted above in Chapter III. The CPI (reported in Table 3.14) is computed as a weighted average of the crop specific after-harvest prices of the major crops in a district.[1/] On the basis of these aggregate producer prices, it was noted that the expected relationship of favourable market access being associated with higher producer prices was not clearly established. (See paragraphs 3.35 to 3.37). The inter-stratum differences are not uniformily in the expected direction — several districts show the highest CPI in MS III. Moreover, even when the relative differences are in the expected direction, the amount of the price differences are very small. The CPI measure, however, involves aggregation over several crops; and inference at the aggregate level can often disguise relationships that do exist at the primary level. Such ambiguities can be avoided by comparing specific prices for major crops grown in each district. Table 6.1 reports separately the after-harvest and current producer price (at time of survey) for each market access stratum.[2/] Excepting Dang and Mustang, all the other

1/ See Appendix B for the derivation of the CPI

2/ The current producer prices are not exactly comparable across districts because the eight districts were surveyed over a 3 month period. Within each district, however, the survey was done within 3 to 4 weeks. The prices reported in Table 6.1 still involve one degree of aggregation, viz. averaging over the two or more village sample sites in a particular market access stratum. For instance, the MS I price reported for Dang is the simple average of the Ghorahi and Tulsipur prices. The panchayat level after-harvest prices and CPI are reported separately in Appendix B.

six districts have a common set of crop prices consisting of paddy, maize, wheat and millet. Millet is not an important crop in Dang; instead prices for two other semi-cash crops, oilseeds and pulses are reported. For Mustang, prices for the two primary crops uwa (naked barley) and phapar (buckwheat) are indicated, along with maize, barley and wheat.

6.2 The hypothesized relationship is that crop prices - both current and after-harvest prices - should be higher in the more favourable market location samples within each district. This is only an approximate expectation because numerous other factors will also affect local prices. More specifically, the relation of each sample site to an integrated marketing and transportation network is not clearly established. Local supply and demand factors can be very important for price determination, especially of after-harvest prices. Furthermore, parametric statistical analysis of the effect of market access on crop specific producer prices at the village level is not attempted because the district sample size (six to nine sample locations) is too small to permit meaningful statistical inference. At a very simple level, one can make a pairwise ranking of specific prices between any two particular market access strata and compute what proportion of these possible comparisons are in the expected direction - i.e. higher prices observed in the sample sites with a more favourable market access within a district. These comparisons are reported in Table 6.2. But initially, a few general comments can be made on the distribution of prices indicated in Table 6.1

6.3 Firstly, substantial price variation occurs not only among the district sample sites but also by season between

the current and after-harvest prices for a single location. For most crops the latter variation is larger than the spatial variation. Myagdi is the district with the highest degree of seasonal variation. Current prices are often double that of after-harvest prices for maize, paddy and wheat. Inter-stratum variations are usually less extreme and they seem to be fairly uniform in each of the sample districts. Spatial variation is also not clearly related to individual crops. Millet has the least degree of variation in prices by market access strata except in Rukum where it is a relatively more important crop. Excepting Rukum, the relative prices of the main food crops are in the same order within and between districts: wheat is most expensive (per unit volume) followed by maize, paddy and millet.

6.4 Looking at the pairwise comparison of crop prices by market access strata (Table 6.2), the expected favourable price effect is stronger in the RCU zones than in Rapti. Only about 42% of the total two-way comparison of specific crop prices are in the expected direction in Rapti whereas this proportion risesto 62% in RCU (73% in Mustang and 66.7% in Gorkha). Among the Rapti districts, Rukum has the most consistent relation between producer prices and market access. Current prices for all four crops (paddy, maize millet, wheat) and the after-harvest price for three crops (paddy is the exception) are found to be higher in MS II than in MS III. On the other hand, the relationship in exactly reversed in Rolpa: all prices are reported to be higher in MS III than in MS II. There is no apparent reason why the choice of sample sites for this survey should yield such a directly conflicting result in two similarly placed districts such

TABLE 6.1

VILLAGE LEVEL CURRENT AND AFTER HARVEST PRICE OF MAJOR CROPS

(in Rs. per pathi)

Districts/ Market Strata		Current and After Harvest Price									
		C	AH	C	AH	C	AH	C	AH	C	AH
	Crops:	Paddy		Maize		Wheat		Oilseed		Pulses	
Dang	I	8.3	6.9	11.8	8.6	13.2	10.7	29.7	20.8	10.2	n.r.
	II	6.3	7.5	8.5	8.0	8.5	6.6	18.8	16.5	9.8	n.r
	III	9.9	8.4	10.6	8.5	10.6	7.3	22.8	18.7	9.3	n.r
	Crops:	Paddy		Maize		Wheat		Millet			
Salyan	I	8.0	7.0	8.0	5.0	9.0	7.0	7.0	6.0		
	II	10.0	7.0	11.0	5.5	10.0	9.0	6.0	5.0		
	III	8.3	5.3	9.0	6.3	10.0	9.6	6.0	4.6		
Pyuthan	I	7.0	7.0	12.0	10.0	10.0	7.0	11.0	10.0		
	II	8.5	7.8	12.0	10.0	11.0	8.5	10.5	10.0		
	III	10.0	8.0	10.6	9.5	10.6	10.6	10.0	10.0		
Rolpa	II	10.0	8.0	10.0	8.0	10.0	9.0	8.0	8.0		
	III	10.5	8.5	11.0	9.5	12.0	10.8	8.0	3.0		
Rukum	II	11.3	7.0	10.0	7.0	11.5	8.0	9.0	5.0		
	III	10.5	7.0	9.0	5.8	10.5	7.3	5.6	4.8		
Gorkha	I	7.5	6.5	12.0	8.5	12.5	10.5	11.0	7.5		
	II	8.5	6.3	12.0	7.5	11.5	10.3	10.3	7.3		
	III	9.3	5.0	12.0	6.6	11.3	11.3	9.3	5.6		
Myagdi	I	18.0	9.0	21.0	11.0	24.0	10.0	14.0	12.0		
	II	16.0	12.0	20.0	14.0	23.3	18.0	15.3	11.3		
	III	14.6	10.6	20.0	14.6	23.3	15.6	14.6	12.0		
	Crops:	Uwa		Maize		Wheat		Barley		Phapar	
Mustang	I	27.0	20.0	25.0	15.0	25.0	20.5	23.0	15.9	26.0	19.9
	II	25.0	25.0	26.5	14.8	25.5	19.0	21.5	15.1	24.5	20.5
	III	25.0	18.1	Not grown		25.0	18.1	18.9	12.5	25.1	18.5

C = Current price at time of survey; AH = After harvest price.
n.r.= Prices not recorded.

TABLE 6.2 A

PAIRWISE COMPARISON OF VILLAGE LEVEL CROP PRICE: RAPTI

Districts	Price Category a/	Number of Pairwise Price Comparisons: Total	Where Price in MS I is > MS III	Where Price in MS II is > MS III	Where Price in MS I is > MS II	Percent in Expected Direction b/
1	2	3	4	5	6	7
Dang	C.	15	4	1	4	60.0
	AH.	12	3	0	2	41.7
	Total	27	7	1	6	51.9
Salyan	C.	12	0	3	1	33.3
	AH.	12	2	2	1	41.7
	Total	24	2	5	1	37.5
Pyuthan	C.	12	2	3	1	50.0
	AH.	12	1	1	0	16.7
	Total	24	3	4	1	33.3
Rolpa	C.	4	-	0	-	0
	AH.	4	-	0	-	0
	Total	8	-	0	-	0
Rukum	C.	4	-	4	-	100.0
	AH.	4	-	3	-	75.0
	Total	8	-	7	-	87.5
RAPTI TOTAL	C.	47	6	11	6	48.9
	AH.	44	6	6	3	34.1
	Total	91	12	17	9	41.8

Memorandum Item:

	MS I vs. MS III	MS II vs. MS III	MS I vs. MS III
Total possible comparisons	25	41	25
No. in expected direction (percentage)	12 (48.0)	17 (41.5)	9 (36.0)

" - " Signifies that pairwise comparisons involving MS I is not possible in Rolpa and Rukum because ~~MS I~~ is not defined.

a/ = C = pairwise comparison on the basis of current (survey time) prices; AH = pairwise comparison on the basis of after-harvest prices.

b/ = This is (col.4+5+6)÷ col.3. It represents the percentage of total pairwise comparison which are in the expected direction, i.e. higher prices in the more favourable market access location.

TABLE 6.2 B

PAIRWISE COMPARISON OF VILLAGE LEVEL CROP PRICE: RCU

Districts	Price Category a/	Number of Pairwise Price Comparisons				
		Total	Where price in MSI is > MSIII	Where price in MSII is > MSIII	Where Price in MSI is > MS II	percent in expected direction b/
1	2	3	4	5	6	7
Gorkha	C.	12	2	2	2	50.0
	AH.	12	3	3	4	83.3
	Total	24	5	5	6	66.7
Myagdi	C.	12	3	2	3	66.7
	AH.	12	0	2	1	25.0
	Total	24	3	4	4	45.8
Mustang	C.	13	3	2	3	61.5
	AH.	13	3	5	3	84.6
	Total	26	6	7	6	73.1
RCU	C.	37	8	6	8	59.5
	AH.	37	6	10	8	64.9
	Total	74	14	16	16	62.2

Memorandum Item:

	MSI vs. MS III	MS II vs. MS III	MS I vs. MS III
Total possible comparisons	24	24	26
No. in expected direction (Percentage)	14 (58.3)	16 (66.7)	16 (61.5)

a/; b/: as in Table 6.2 A.

as Rukum and Rolpa, apart from the fact that local supply and demand conditions can be very different in each of these survey locations.

6.5 The producer price raising effect of market access should be clearly demonstrated at least in the comparisons between MS I and MS III samples because the difference in market access is the most extreme between these two strata. But even within this limited set, only about 50% of the prices are higher in MS I in both Rapti and the RCU zones. This is certainly not a sufficiently strong indication of the favourable effects of market access on producer prices. The analysis of specific crop prices thus reinforces the earlier finding on the basis of the aggregrate producer prices (CPI) that relatively better market access within the sample districts does not significantly increase price received by farmers. It is apparent that the remoteness and transportation cost are reflected in the high grain prices in the MS III samples. In these locations prices are determined more by the costs of importing grain rather than by the imperative of local surplus disposal.

(ii) Household selling prices

6.6 The preceding section discussed the relation between market access and village level producer prices. One can also analyze the producer price - market access relation by comparing the actual sale price received by those producers who report sales of specific crops. Such comparisons are possible only for a few crops in four districts - Dang, Rukum, Mustang and Gorkha - because the incidence of sales of primary agricultural crops is very limited among the sample households.

6.7 Even in Dang, which is a surplus food producing district, the number of households who report any sales of paddy (the main crop) is unexpectedly low: only 20 out of 271 households,

TABLE - 6.3

ACTUAL AVERAGE SALES PRICE OF MAJOR CROPS

(in Rs. per muri = 20 pathis)

Districts	Crops	MS I	MS II	MS III	District Average	Number of Cases
Dang	Paddy	122	105	167	124	20
	Mustard	360	350	300	334	124
Rukum	Paddy	a/	153	187	174	31
	Maize	a/	125	140	132	31
Gorkha	Paddy	132	154	130	144	28
	Wheat	203	188	x	194	18
Mustang	Barley	410	x	413	411	18
	Wheat	x	202	340	271	15

a/ MS I category not defined in Rukum.

"x" indicates that none of the sample households in the particular stratum report sales of the relevant crop.

or less than 8% of the sample. Sales of mustard seeds are however, quite common since they are grown as a cash crop. The average selling price for these selected crops by market access stratum is reported in Table 6.3. There are eight district-crop combinations, three of which are for paddy. Oilseed in Dang represents the only case where the average selling price is systematically lower in the less favourable market access stratum. The price ranges from an average of Rs.360 per muri in MS I to Rs.350 in MS II and Rs.300 in MS III. The 20% difference between MS I and MS III average

selling prices is quite high; but it is not statistically significant given the actual household distribution of mustard seed selling prices. Wheat sales in Gorkha represent an even smaller relative price differential in the expected direction: Rs.203 per muri in MS I and Rs.188 in MS II (no wheat sales reported in MS III). But in all the other instances, the average selling prices are approximately equal or even higher in MS III.[3/]

(iii) Price consistency

6.8 Market access in conjunction with storage facilities is expected to reduce seasonal as well as annual price fluctuations. A lower variance of producer prices can be an important contribution of market access for increasing agricultural production and the marketed surplus. Small farmers in particular may be averse to tailoring production to market demands if selling prices (as well as the buying prices for home-consumption purchases) are very volatile.

6.9 Price variability, however, is not easily measured. Ideally one should construct a seasonal price index, weighted by the volume of transactions, but which does not reflect the trend effect of a general price increase from one year to another. This would require a comprehensive time series of local level prices which could not be collected in a one-period survey. As an approximate measure, price consistency is estimated by expressing the absolute difference between

3/ The prices reported in Table 6.3 are imputed prices, computed by dividing total household sales revenue by the physical quantity of crops sold. They gloss over differences in grain quality and variety, and the timing of sales. Consequently, these prices also are only an approximate basis for statistical inference about the price effects of market access.

the minimum and maximum price within the reference period of the survey as a ratio of the average price during this period. Such a ratio is computed for each of the major crops in a district. An aggregate measure of price consistency is also computed by averaging the several crop ratios on the basis of district specific weights which reflect the relative importance of these crops.[4/] This ratio represents the average percentage change in prices within the survey reference period (1 year).

6.10 The first thing to note in Table 6.4 is that a high degree of price fluctuation is reported during the annual reference period in all districts. For every crop in each district, there is more than a 20% variation in prices throughout the year; and some cases with more than a 70% variation also occur. No clear pattern is observed at the district level. Rolpa and Rukum have the highest fluctuation which is consistent with their remoteness and lack of transportation. On the other hand, Mustang and Myagdi, which are also remote, report low variability. Pyuthan, unexpectedly, has the lowest average variation - even smaller than in Dang for all three market access strata.

6.11 The expected relationship between favourable market access and lower price variability within a district is observed in

4/ As in the case of the aggregate crop producer price (CPI) in Table 3.14, these weights are held constant within a district even if the sample sites represent different ecological zones and have different cropping patterns. The weights for the CPI index and the price consistency index are different because fewer crops are included in the latter index. See Appendix E.

TABLE 6.4.

PRICE CONSISTENCY: RATIO OF MINIMUM-MAXIMUM RANGE TO AVERAGE PRICE

District/ Market Strata		Crops					Weighted Average
		Paddy	Maize	Wheat	Mustard		
Dang	I	.34	.32	.27	.26		.32
	II	.30	.33	.38	.26		.31
	III	.28	.37	.47	.23		.31
		Paddy	Maize	Wheat	Millet		
Salyan	I	.25	.43	.22	.28		.22
	II	.50	.72	.48	.38		.48
	III	.48	.30	.35	.40		.35
Pyuthan	I	.26	.17	.50	.13		.23
	II	.24	.18	.29	.12		.20
	III	.27	.21	.42	.15		.25
Rolpa	II	.22	.21	.60	-		.31
	III	.41	.33	.81	-		.77
Rukum	II	.49	.33	.37	-		.37
	III	.55	.62	.42	-		.55
Gorkha	I	.34	.35	.20	.21		.31
	II	.43	.49	.17	.48		.43
	III	.35	.49	.36	.41		.41
Myagdi	I	.47	.35	.34	.28		.38
	II	.28	.29	.21	.31		.28
	III	.36	.29	.51	.28		.33
		Maize	Wheat	Barley	Uwa	Phapar	
Mustang	I	.49	.20	.45	.29	.67	.43
	II	.54	.32	.37	b/	.21	.40
	III	a/	.31	.38	.31	.44	.36

a/ Maize is not locally grown inthe MS III sample sites of Mustang

b/ The maximum-minimum price range for Uwa (naked barley) in stratum II was not recorded.

four districts in terms of the aggregate index of the major crops. These districts are Salyan, Rolpa, Rukum, and Gorkha, though in Salyan and Gorkha, the highest variability is observed in MS II rather than in MS III. The relative strata difference is sharpest in Rolpa where the average price fluctuation is 31% in MS II in comparison to 77% in MS III. The expected result is quite general in these four districts since it is observed for each of the major crops listed in Table 6.4 as well as in the aggregate index. As for the remaining four districts, the aggregate price fluctuation is approximately equal among the market access strata in Dang and Pyuthan. But in Mustang and Myagdi price variability is higher in the more favourable market locations. This contradictory result is mainly due to paddy and maize prices in Myagdi and due to phapar (buck-wheat) prices in Mustang.

6.12 The relationship between market access and lower price fluctuation which is observed in half of the sample districts provides a reasonable degree of evidence for the variance reducing effect of market access. The result would have been stronger if it had also occurred within Dang because there is a greater uniformity on other control variables among the sample sites in Dang than in the other districts.

B. STORAGE AND MARKETING PROBLEMS

6.13 Subjective information on the nature and type of marketing problems faced by the farm/household was also collected in the survey. Three different problem areas were identified: (1) inadequate storage facilities, and the subsequent necessity to sell grains immediately after harvest; (2) general problems in the marketing of food-grains; and (3) market related problems in purchasing modern agricultural inputs.

(i) Storage and immediate crop sales

6.14 Post - harvest storage of crops is almost universally done within the farm/household itself according to traditional methods. These traditional storage methods include bamboo and straw containers (bhakari), and earthen vessels (ghyampo), wooden containers, dug-out pits, and open air storage. In the entire sample of 1506 households only two cases (both of which are in MS III) reported a non-traditional storage method - the godown of the local saiha (co-operative) society. Quantitative estimates of the amount of storage loss by method used are not made in this study. Storage losses will vary not only according to method and grain but also in a non-linear manner with duration of storage.[5/] Obviously storage losses can be reduced substantially through appropriate new technologies, but in the sample survey for this study, households have not identified storage as a major problem. Inadequate storage also does not induce households to make immediate post-harvest sales.

6.15 The proportion of sample households who report immediate post-harvest crop sales and the reason for such sales are indicated in Table 6.5. None of the households in three of the eight districts - Salyan, Pyuthan and Rolpa - report immediate post-harvest sales. The number of households with such sales is highest in Dang as is the number of households who report any crop sales throughout the year. Expressed as a percentage of households who report any crop sales, the

5/ Average storage losses with traditional methods (irrespective of time duration) are estimated to be 4 to 8% at the farm level in Nepal. This appears to be a very low estimate; and even if valid on average, losses will increase greatly with storage duration. cf. T. B. Basnyat (1981).

TABLE 6.5

PERCENTAGE DISTRIBUTION OF IMMEDIATE CROP SALE AND REASONS

Districts/ Market Strata		Sample Size	No.with Crop Sale	No.with Immediate Crop Sale	Reasons for Immediate Crop Sale: Lack of Storage	Cash Needs	Loan Payment	Profitable	Others a/
1		2	3	4	5	6	7	8	9
	I	108	55	10(18.2)	0	9	0	0	1
Dang	II	59	40	11(27.5)	0	10	1	0	0
	III	104	56	13(23.2)	0	11	1	0	1
	Total	271	151	34(22.5)	0	30	2	0	2
Rukum	II	53	13	3(23.1)	0	3	0	0	0
	III	95	32	6(18.8)	0	5	1	0	0
	Total	148	45	9(20.0)	0	8	1	0	0
	I	220	65	10(15.4)	0 (-)	9 (90.0)	0 (-)	0 (-)	1 (10.0)
Rapti b/	II	335	66	14(21.2)	0 (-)	13 (92.9)	1 (7.1)	0 (-)	0 (-)
TOTAL	III	448	107	19(7.8)	0 (-)	16 (84.2)	2 (10.5)	0 (-)	1 (5.3)
	Total	1003	238	43(18.1)	0 (-)	38 (88.3)	3 (7.0)	0 (-)	2 (4.7)
	I	72	15	3(20.0)	0	2	0	0	1
Gorkha	II	104	25	5(20.0)	0	4	1	0	0
	III	76	4	1(25.0)	0	0	0	0	1
	Total	252	44	9(20.5)	0	6	1	0	2
	I	49	10	4(40.0)	1	2	1	0	0
Myagdi	II	72	4	1(25.0)	0	1	0	0	0
	III	70	4	0(-)	0	0	0	0	0
	Total	191	18	5(27.8)	1	3	1	0	0
	I	62	17	0(-)	0	0	0	0	0
Mustang	II	39	17	2(11.8)	0	0	0	0	2
	III	59	4	0(-)	0	0	0	0	0
	Total	160	38	2(5.3)	0	0	0	0	2
	I	183	42	7(16.7)	1 (14.3)	4 (57.1)	1 (14.3)	0 (-)	1 (14.3)
RCU	II	215	46	8(17.4)	0 (-)	5 (62.5)	1 (12.5)	0 (-)	2 (25.0)
	III	205	12	1(8.3)	0 (-)	0 (-)	0 (-)	0 (-)	1 (100)
	Total	603	100	16(16.0)	1 (6.2)	9 (56.3)	2 (12.5)	0 (-)	4 (25.0)

Figures in the parenthesis in col. (4) indicate the percentage with respect to the total in col.(3) which is the proportion of households reporting immediate crop sale out of the total households with any crop sales.

a/ Other category includes cases where no reason has been recorded for immediate crop sales.

b/ No households report any immediate crop sales in Salyan, Pyuthan and Rolpa districts (out of a total of 42 households who have any sales of crops in those districts).

proportion with immediate sales is moderate in Dang. These cases therefore represent a higher degree of commercialization and market participation in Dang rather than distress sales or sales related to inadequate storage. Inadequate storage is cited as a reason in only one case (MS I of Myagdi) out of a total of 58 households reporting immediate sales. The most common reason cited (by 45 households in total) in every district is to obtain cash income to meet family consumption purchases.

(ii) General Marketing Problems

6.16 Sample households were asked whether they faced any specific problems in selling farm production. This was asked of all households irrespective of whether they actually sold any item of primary farm production. But several of the households without any sales responded that they did not have specific marketing problems because they did not market any items. Such a response is open to interpretation, but we have taken it to imply that the household is not concerned with marketing problems because market sales are not viable or profitable for the particular household. This response has been coded separately as "not applicable" in Table 6.6 A and B.[6/]

6/ The questions about marketing problems and problems in input purchases (dealt with in the subsequent section) were not forced to coincide with the incidence of actual market sales or input purchases of households. This would have excluded those households who report no sales or input purchase precisely because of marketing problems. On the other hand, the overall incidence of market sales or purchased inputs is limited in all of the eight district samples. It is due also to other more substantial causes (i.e. a poor resource base) rather than marketing problems alone. So many households can genuinely respond that marketing problems are not an important concern because their decision about market sales and input purchase are not related to such problems. These are the households which should be coded as not applicable. But given the subjective open-ended nature of both of these questions, one can certainly have doubts about the actual implication of respondents who report no marketing problems because they do not market any farm production or buy inputs.

6.17 The proportions of household with a "not applicable" response are very high (exceeding 75%) in five districts- Salyan, Pyuthan, Rolpa, Gorkha and Myagdi. These are the districts where actual market participation is limited (see Table 3.10A and B). A household's subjective perception of marketing problems is strongly conditioned by actual sales. For the few cases in these districts where a definite marketing problem is identified, the most common response is that markets are too distant. Inter-stratum comparisons of specific marketing problems are not meaningful in these areas because of the very small number of households involved.

6.18 The number of households who clearly admit facing marketing problems is highest in Rukum (74 out of a total sample of 148) and Dang (107 out of 270). Both districts show a definite tendency of fewer MS I households who report marketing problems. This proportion (out of the applicable household sample) is 17% in MS I of Dang in contrast to 36% and 73% in MS II and III, respectively. The corresponding proportions in Rukum are 34%, 77% and 62% respectively by stratum. Excepting MS I in Dang (which consists of Ghorahi and Tulsipur), the most common problem is that markets are too distant. The number of households who report this problem is relatively higher in MS II and MS III than in MS I. Mustang represents the odd case where neither the acknowledgement of marketing problems nor the specific problem identified are related to market access in the expected manner as in Dang and Rukum. Surprisingly the MS I sample (Jomsom and Marpha) has the highest proportion of households with marketing problems, all of whom claim markets are too distant. This is a good illustration of the ambiguous responses one gets to subjective questions: the reference market location need not be uniform for all households.

TABLE 6.6 A

NUMBER OF HOUSEHOLD REPORTING PROBLEMS IN MARKETING OF PRIMARY FARM PRODUCTS: RAPTI

Districts/ Market Strata	Sample Size	Marketing Problems			Type of Problems a/			
		NAP	NO	YES	DISM	UNPR	NODM	OTH
1	2	3	4	5	6	7	8	9
Dang								
I	107	8	82(82.8)	17(17.2)	4	11	2	0
II	59	2	36(63.2)	21(35.8)	17	4	0	0
III	104	10	25(26.6)	69(73.4)	68	1	0	0
Total	270	20	143(57.2)	107(42.8)	89	16	2	0
Salyan								
I	53	43	5(50.0)	5(50.0)	3	0	2	0
II	69	56	10(76.9)	3(23.1)	2	1	0	0
III	73	55	7(38.9)	11(61.1)	11	0	0	0
Total	195	154	22(53.7)	19(46.3)	16	1	2	0
Pyuthan								
I	59	44	8(53.3)	7(46.6)	6	1	0	0
II	57	54	3(100)	0(-)	0	0	0	0
III	73	67	6(100)	0(-)	0	0	0	0
Total	189	165	17(70.8)	7(29.2)	6	1	0	0
Rolpa								
II	97	92	4(80.0)	1(20.0)	0	0	0	1
III	100	62	31(61.6)	7(18.4)	3	0	0	4
Total	197	154	35(81.4)	8(18.6)	3	0	0	5
Rukum								
II	53	12	27(65.9)	14(34.1)	9	1	4	0
III	95	17	18(23.1)	60(76.9)	59	0	1	0
Total	148	29	45(37.8)	74(62.2)	68	1	5	0
Rapti Total I	219	95	95(43.4)	29(13.2)	13(44.8)	12(41.4)	4(13.8)	0
II	335	216	80(23.9)	39(11.6)	28(71.8)	6(15.4)	4(10.3)	1(2.5)
III	445	211	87(19.6)	147(33.0)	141(95.9)	1(0.7)	1(0.7)	4(2.7)
Total	998	522	262(26.3)	215(21.5)	182(84.7)	19(8.8)	9(4.2)	5(2.3)

a/ See explantory notes to Table 6.6 B.

TABLE 6.6 B

NUMBER OF HOUSEHOLD REPORTING PROBLEMS IN MARKETING OF PRIMARY FARM PRODUCTS: RCU

Districts/ Market Strata	Sample Size	Marketing Problems			Type of Problems a/			
		NAP	NO	YES	DISM	UNPR	NODM	OTH
1	2	3	4	5	6	7	8	9
Gorkha								
I	72	65	1(14.3)	6(85.7)	5	0	1	0
II	104	68	25(69.4)	11(30.6)	9	2	0	0
III	76	75	1(100)	0(-)	0	0	0	0
Total	252	208	27(61.4)	17(38.6)	14	2	1	0
Myagdi								
I	49	40	3(33.3)	6(66.7)	5	1	0	0
II	63	58	4(80.0)	1(20.0)	1	0	0	0
III	63	59	4(5.7)	0(-)	0	0	0	0
Total	175	157	11(61.1)	7(38.9)	6	1	0	0
Mustang								
I	62	42	15(75.0)	5(25.0)	5	0	0	0
II	39	18	17(81.0)	4(19.0)	2	0	2	0
III	59	51	7(87.5)	1(12.5)	0	0	1	0
Total	160	111	39(79.6)	10(20.4)	7	0	3	0
RCU I	183	147	19(10.4)	17(9.3)	15(88.2)	1(5.9)	1(5.9)	0
TOT- II	206	144	46(22.3)	16(7.8)	12(75.0)	2(12.5)	2(12.5)	0
AL III	198	185	12(6.1)	1(0.5)	0(-)	0(-)	1(100)	0
Total	587	476	77(13.1)	34(5.8)	27(79.4)	3(8.8)	4(11.8)	0

a/ Type of marketing problems are:

DISM = Markets are too distant

UNPR = Unprofitable and/or uncertain market prices

NODM = Insufficient demand for purchases

OTH = Others, including unspecified reasons

The figures in parenthesis in col. 4 and 5 are the percentages with respect to the relevant sample size-i.e. (col. 2 - col. 3) The figures in col. 6,7 and 8 are percentages with respect to col. 5.

6.19 Looking at all the eight districts samples, a relatively small total of 249 households (15%) report specific problems in the marketing of primary farm products. The overwhelming proportion of these responses (209 - i.e. 85% of the 249 households) is that of a far away market. Thirteen households claim insufficient local demand for their production items as their specific problem; while 22 households (16 of which are in Dang) claim low and uncertain prices.7/

(iii) Agricultural Inputs Purchases

6.20 Households were also questioned about specific problems related to the timely purchase of agricultural inputs (seeds, fertilizers, insecticides and farm implements). Responses were classified in the same manner as in the previous question on output marketing problems - i.e. the question has been deemed not applicable to those households whose response indicates that purchasing problems do not arise because the household does not currently use purchased non-labour inputs. With this interpretation, most of the sample households of Rolpa, Pyuthan, Mustang and Myagdi fall in the "not applicable" category. What is surprising is that a fairly large proportion of the remaining households in these districts report no specific problems in input purchases: i.e. 33 of the remaining 44 households in Pyuthan; 26 out of 38 in Rolpa, and 30 out of 42 in Mustang. Few households even in the remote northern samples report purchasing problems.

6.21 Input purchasing problems are more commonly reported in Gorkha and in three Rapti districts - Salyan, Rukum and Dang.

7/ Multiple responses were not permitted in the question identifying marketing problems.

TABLE 6.7 A

NUMBER OF HOUSEHOLDS REPORTING PROBLEMS IN PURCHASING AGRICULTURAL INPUTS: RAPTI

Districts/ Market Strata		Sample Size	Problems NAP	NO	YES	Type of Problems a/ A	B	C	D	E	F
1		2	3	4	5	6	7	8	9	10	11
Dang	I	108	23	40 (47.1)	45 (52.9)	3	13	22	0	0	7
	II	58	13	18 (40.0)	27 (60.0)	6	12	9	0	0	0
	III	103	20	29 (34.9)	54 (65.1)	12	20	16	4	0	2
	Total	269	56	87	126	21	45	47	4	0	9
Salyan	I	52	7	36 (80.0)	9 (20.0)	1	8	0	0	0	0
	II	69	63	0 (-)	6 (100)	1	4	0	0	1	0
	III	74	32	13 (31.0)	29 (69.0)	5	18	5	1	0	0
	Total	195	102	49	44	7	30	5	1	1	0
Pyuthan	I	59	48	4 (36.4)	7 (63.6)	4	3	0	0	0	0
	II	57	56	0 (-)	1 (100)	1	0	0	0	0	0
	III	74	42	29 (90.6)	3 (9.4)	3	0	0	0	0	0
	Total	190	146	33	11	8	3	0	0	0	0
Rolpa	II	95	88	1 (14.3)	6 (85.7)	3	0	2	0	1	0
	III	101	70	25 (80.6)	6 (19.4)	5	1	0	0	0	0
	Total	196	158	26	12	8	1	2	0	1	0
Rukum	II	53	12	20 (48.8)	21 (51.2)	18	2	1	0	0	0
	III	95	9	14 (16.3)	72 (83.7)	38	19	4	3	8	0
	Total	148	21	34	93	56	21	5	3	8	0
RAPTI	I	219	78	80 (56.7)	61 (43.3)	8 (13.1)	24 (39.3)	22 (36.1)	0 (-)	0 (-)	7 (11.5)
	II	332	232	39 (39.0)	61 (61.0)	29 (47.5)	18 (29.5)	12 (19.7)	0 (-)	2 (3.3)	0 (-)
TOTAL	III	447	173	110 (40.1)	164 (59.9)	63 (38.4)	58 (35.4)	25 (15.2)	8 (4.9)	8 (4.9)	2 (1.2)
	Total	998	483	229 (44.5)	286 (55.5)	100 (35.1)	100 (35.1)	59 (20.6)	8 (2.7)	10 (3.4)	9 (3.1)

a/ See explanatory notes to Table 6.7 B.

TABLE 6.7 B

NUMBER OF HOUSEHOLDS REPORTING PROBLEMS IN PURCHASING AGRICULTURAL INPUTS: RCU

Districts/ Market Strata		Sample Size	Problems			Type of Problems a/					
			NAP	NO	YES	A	B	C	D	E	F
1		2	3	4	5	6	7	8	9	10	11
Gorkha	I	72	37	19 (54.3)	16 (45.7)	13	1	1	0	0	1
	II	104	56	22 (45.8)	26 (54.2)	8	4	3	1	9	1
	III	75	53	12 (54.5)	10 (45.5)	4	3	3	0	0	0
	Total	251	146	53	52	25	8	7	1	9	2
Myagdi	I	49	41	1 (12.5)	7 (87.5)	7	0	0	0	0	0
	II	68	67	1 (100)	0 (-)	0	0	0	0	0	0
	III	62	54	2 (25.0)	6 (75.0)	3	0	0	1	2	0
	Total	179	162	4	13	10	0	0	1	2	0
Mustang	I	62	37	18 (72.0)	7 (28.0)	2	4	0	0	1	0
	II	39	24	12 (80.0)	3 (20.0)	0	1	2	0	0	0
	III	59	57	0 (-)	2 (100)	1	0	0	0	1	0
	Total	160	118	30	12	3	5	2	0	2	0
RCU TOTAL	I	183	115	38 (55.9)	30 (44.1)	22 (73.3)	5 (16.7)	1 (3.3)	0 (-)	1 (3.3)	1 (3.3)
	II	211	147	35 (54.7)	29 (45.3)	8 (27.6)	5 (17.2)	5 (3.4)	1 (3.4)	9 (31.0)	1 (3.4)
	III	196	164	14 (43.7)	18 (56.3)	8 (44.4)	3 (16.7)	3 (16.7)	1 (5.5)	3 (16.7)	0 (-)
	Total	590	426	87 (53.0)	77 (47.0)	38 (50.0)	13 (17.1)	9 (11.7)	2 (2.6)	13 (17.1)	2 (1.5)

a/ Type of problems are:- A=Lack of inputs; B=High price and high transport cost; C=Lack of purchasing power; D=Long distance to the market; E=More than one of the above (A to D); F=Other reasons, including cases where a reason was not recorded.

The figures in parenthesis in col. 4 and 5 are the percentage with respect to the relevant sample size i.e. (col.2-col.3). The figures in columns 6 to 11 are percentages with respect to col. 5.

In Gorkha, the relative incidence of this problem is not related to market access. Approximately half of the sample in each stratum (i.e. from 45% to 54) report input purchasing problems, of which the most common claim is that modern inputs are not locally or easily available. The three Rapti districts, however, show a higher incidence of input purchasing problems in MS II and MS III samples. This proportion (out of the applicable numbers of households) varies from 51% in MS II to 84% in MS III of Rukum. The corresponding proportions in Salyan are 20% in MS I and 100% in MS II and 69% in MS III. The strata differences are relatively smaller in the case of Dang. Considering the specific purchasing problems, local non-availability of the modern agricultural inputs is the main problem in all districts except Dang, Salyan and Mustang. In these latter three districts, households most often cite the high price (including own transportation, if required) of inputs as the major problem.

C. RESPONSE TO MARKET ACCESS IMPROVEMENT

6.22 The survey questionnaire also elicited information about the possible adjustments in household resource allocation and market participation in response to better marketing and transportation facilities. This information was recorded from two time perspectives. Firstly, households were asked whether they thought marketing and transport facilities had increased in their area, and what, if any, production adjustments they had made (Tables 6.8 and 6.9). Secondly, households were also questioned about possible responses in future if marketing and transportation facilities to their area were to be improved (Table 6.10). To reduce the margin of subjective and overly generalized responses, both questions were coded on the basis of preselected specific responses.

(i) Recent improvements in transportation and marketing facilities

6.23 Tables 6.8 A and B indicate that about 36% of the sample households in Rapti and 24% in RCU claim recent improvements in transportation and marketing. These responses are not uniform for specific locations - i.e. some households in a given sample site may claim improvements while others in the same location do not agree. Households report only their subjective assessment. In Rapti zone, approximately half of the sample households in Pyuthan, Rolpa and Dang claim better market access. The response in these districts is consistent with the recent opening up of motorable road transportation though access is often seasonal. Salyan is the odd case in the Rapti zone where only 6 households (of which 4 are in MS I) out of a total sample of 196 claim recent market access improvements. In the RCU zones, between 40 to 45% of the sample households in Myagdi claim some improvement while this proportion falls, as expected, in Mustang to only 10% and in Gorkha, unexpectively, to 16%.

6.24 The proportion of households reporting improvement in marketing facilities is strongly correlated with the sample market stratum. More than 70% of the sample households in MS I of Dang and in MS I and MS II of Pyuthan report marketing and transportation improvements. The corresponding proportion in MS III of both of these districts is less than 20%. In Rukum, none of the MS III households (a total of 95) report such improvements in contrast to 63% in MS I. Strata-wise differences are also significant in Rolpa. The same correlation is observed in Mustang and to a lesser extent in Gorkha. None of the MS III households in Mustang report recent improvements in market access, in contrast to 21% in MS I. Myagdi,

TABLE 6.8 A

EFFECT OF RECENT MARKET ACCESS IMPROVEMENT: RAPTI

Districts/ Market Strata		Sample Size	No. Who Claim Better Market Access	No. With Increased Sales	No. With Increased Production	No. With Change in Production Pattern
1		2	3	4	5	6
	I	108	77 (71.3)	30(38.9)	14(18.2)	9(11.7)
Dang	II	59	28 (47.5)	8(28.6)	3(10.7)	1(3.6)
	III	104	16 (15.4)	0(-)	0(-)	0(-)
	Total	271	121(44.6)	38(31.4)	17(14.0)	10(8.3)
	I	53	4 (7.5)	1(25.0)	0(-)	0(-)
Salyan	II	69	0 (-)	0(-)	0(-)	0(-)
	III	74	2 (2.7)	0(-)	0(-)	0(-)
	Total	196	6 (3.1)	1(16.7)	0(-)	0(-)
	I	59	51 (86.4)	9(17.6)	5(9.8)	2(3.9)
Pyuthan	II	57	44(77.2)	8(18.2)	8(18.2)	1(2.3)
	III	74	13 (17.6)	0(-)	0(-)	0(-)
	Total	190	108 (56.8)	17(15.7)	13(12.0)	3(2.8)
	II	97	64 (66.0)	5(7.8)	2(3.1)	4(6.3)
Rolpa	III	101	30 (29.7)	0(-)	0(-)	4(13.3)
	Total	198	94(47.5)	5(5.3)	2(2.1)	8(8.5)
	II	53	33(62.3)	20(60.6)	15(45.5)	16(48.5)
Rukum	III	95	0(-)	0(-)	0(-)	0(-)
	Total	148	33(22.3)	20(60.6)	15(45.5)	16(48.5)
	I	220	130(59.1)	40(30.8)	19(14.6)	11(8.5)
RAPTI	II	335	169(50.4)	41(24.3)	28(16.6)	20(11.8)
	III	448	61(13.6)	0(-)	0(-)	4(6.6)
	Total	1003	360(35.9)	81(22.5)	47(13.1)	35(9.7)

Figures in the parenthesis in colum 4, 5, and 6 are percentages with respect to the total in column 3. Figures in parenthesis in col. 3 are percentages with respect to the total sample size in col. 2.

TABLE 6.8 B

EFFECT OF RECENT MARKET ACCESS IMPROVEMENTS: RCU

Districts/ Market Strata		Sample Size	No. Who Claim Better Market Access	No. With Increased Sales	No. With Increased Production	No. With Change in Production Pattern
1		2	3	4	5	6
	I	72	17(23.6)	6(35.3)	5(29.4)	0(-)
Gorkha	II	104	22(21.2)	9(40.9)	7(31.8)	6(27.3)
	III	76	1(1.3)	0(-)	0(-)	0(-)
	Total	252	40(15.9)	15(37.5)	12(30.0)	6(15.0)
	I	49	17(34.7)	8(47.1)	3(17.6)	2(11.8)
Myagdi	II	72	33(45.8)	4(12.1)	1(3.0)	1(3.0)
	III	70	37(52.9)	3(8.1)	1(2.7)	1(2.7)
	Total	191	87(45.5)	15(17.2)	5(5.7)	4(4.6)
	I	62	13(21.0)	0(-)	0(-)	7(53.8)
Mustang	II	39	3(7.7)	0(-)	0(-)	1(33.3)
	III	59	0(-)	0(-)	0(-)	0(-)
	Total	160	16(10.0)	0(-)	0(-)	8(50.0)
	I	183	47(25.7)	14(29.8)	8(17.0)	9(19.1)
RCU	II	215	58(27.0)	13(22.4)	8(13.8)	8(13.8)
TOTAL	III	205	38(18.5)	3(7.9)	1(2.6)	1(2.6)
	Total	603	143(23.7)	30(20.9)	17(11.9)	18(12.6)

Figures in the parenthesis in col. 4,5, and 6 are percentages with respect to total in column 3. Figures in parenthesis in col. 3 are percentages with respect to the total sample size in col. 2.

however, shows a conflicting tendency. Recent improvements are claimed most widely in MS III (by 53% of the households) in contrast to 46% in MS II and 35% in MS I.

6.25 One should note that the 23.6% of households in MS I of Gorkha who acknowledge recent market access improvements is unexpectely low given that a motorable road connection has been recently established. The Narayanghat-Gorakhkali road, on which both of the MS I sample sites in this study lie, was formally declared open approximately a year and a half prior to the survey. But vehicular traffic had begun operation on the road from long before. In the context of subsistence-agriculture within a food deficit region, the relation between motorable roads and increased market access and participation need not always be straightforward. This matter has not been directly addressed in the present study. Previous studies have indicated that the effective use of motorable transportation for carrying farm products or inputs ceases beyond a day's walk from the road-head.[8/] The MS I sample sites of Gorkha are not only situated on the road but they each are important breakage and loading points[9/]; but for these households, even the recognition of improved marketing access due to the road-head is very limited.

6.26 In contrast to the number who claim that market access has improved in the recent past, the proportion of these

8/ cf. Blaike, et. al (1976)

9/ Of the two sample sites in MS I, Gorkhkali, the district headquarters is, of course, the terminal point of the highway. The other site, Taranagar, lies on the 13 kilometer stop which is quickly emerging as an important local retail market and load breaking point.

households who actually report a favourable impact of better market access is very small. Questions were asked on three different responses: (i) increase in sales of farm products; (ii) increase in farm production, due to higher sales possibility and (iii) changes in cropping rotation and/or in household production pattern.

6.27 The response to market access improvements on all of these three counts is most favourable in Rukum within Rapti zone. Out of the 33 households (all in MS II) who reported market access improvements, 20 increased sales, 15 increased production and 16 report changes in production pattern. A comparable degree of response is seen in MS I of Dang. About 40% claim increased sales; but fewer than 20% claim increased production or changes in production pattern. The response on all three items is reduced substantially in MS II of Dang; and in MS III, none of the 16 households report any adjustment to improved market access. Response to market access is negligible in the other Rapti districts. Among all of the Rapti district households who report improved market access, 22.5% report increased sales (none of which are in MS III); 13.1% report increased production due to sales (none of which also are in MS III); and only 9.7% report production pattern changes (of which 11% are in MS III).

6.28 Response to market access improvements is more limited in the RCU zones, particularly in Myagdi. But the correlation with the sampling market stratum remains. Of the relevants MS I households, 30% report increased sales, 17% report increased production and 19% changes in production pattern. The corresponding proportions in MS II (and MS III) are 22% (8%), 14% (2.6%) and 14% (2.6%) respectively.

6.29 Additional information on the response of household production was obtained by asking households whether they had increased own-farm production of the specific crops which had registered the highest price increase within the last several years. Everywhere most households identified this crop to be paddy (Table 6.9).

6.30 The response of production to the increase in the relative price of a particular corp is, however, minimal. The proportion of sample households who report increased production is highest in Rukum (21%) and Gorkha (19%); but in the other district the proportion is much lower. Only 5% of the sample or less report increased production in response to rising relative prices in Salyan, Pyuthan, Rolpa and Myagdi. In these four districts and in Gorkha, the majority of households report that they have not increased production because they do not make any sales. The implication is that subsistence consumption of the major crops - especially of paddy which is the preferred consumption crop - is not very sensitive to relative price changes.

6.31 Considering the three districts where a limited resource allocation effect of rising relative prices is observed (Dang, Rukum, and Gorkha), the response in Dang and Gorkha is proportionally higher in the favourable market access stratum. For instance, 18.5% of MS I households of Dang report increased production in contrast to 9.6% in MS III. The corresponding proportion is 29.2% in MS I of Gorkha and 24% in MS II in comparison to a lowly 2.6% in MS III. About 17% of the combined Dang and Rukum sample report increased production in response to rising relative prices; while in the remaining

TABLE 6.9 A

INCREASED PRODUCTION OF CROP WITH HIGHEST RELATIVE PRICE INCREASE: RAPTI

Districts/ Market Strata		Sample Size	Crops	No. of Households Responding: Yes	No because of no sale	Other No
Dang	I	100	Paddy, Mustard	20 (18.5)	15 (13.9)	69 (63.9)
	II	59	Mustard, Paddy	10 (16.9)	14 (23.7)	36 (59.3)
	III	104	Mustard, Paddy	10 (9.6)	27 (25.9)	52 (50.0)
	Total	271		40 (14.8)	56 (20.7)	156 (57.6)
Salyan	I	53	Paddy, Mustard	3 (5.6)	26 (49.1)	24 (45.3)
	II	69	Paddy, Wheat	3 (4.3)	37 (53.6)	17(24.6)
	III	74	Paddy, Wheat	1 (1.4)	61 (82.4)	11 (14.9)
	Total	196		7 (3.6)	124 (63.3)	52 (26.5)
Pyuthan	I	59	Maize	1 (1.6)	55 (93.2)	3 (5.0)
	II	57	[illegible]	0	57 (100)	0
	III	74	Maize, Wheat	4 (5.4)	69 (93.2)	0
	Total	190		5 (2.6)	181 (95.3)	3 (1.6)
Rolpa	II	97	Paddy, Wheat	6 (6.1)	63 (64.9)	16 (16.5)
	III	101	Maize, Paddy	3 (2.9)	71 (70.2)	19 (18.8)
	Total	198		9 (4.5)	134 (67.7)	35 (17.7)
Rukum	II	53	Paddy	13 (24.5)	5 (9.4)	34 (64.2)
	III	95	Paddy, Pulses	18 (18.9)	12 (12.6)	65 (68.4)
	Total	148		31 (20.9)	17 (11.5)	99 (66.9)
Rapti	I	220	[illegible]	24 (10.9)	96 (43.6)	96 (43.6)
	II	335		32 (9.65)	176 (52.5)	102 (30.4)
	III	448		36 (8.0)	240 (53.6)	147 (32.8)
	Total	1003		92 (9.2)	512 (51.0)	345 (34.4)

Figures in parenthesis indicate the percentages with respect to the sample households in each stratum.

TABLE 6.9 B

INCREASED PRODUCTION OF CROP WITH HIGHEST RELATIVE PRICE INCREASE: RCU

Districts/ Market Strata		Sample Size	Crops	No. of Households Responding: Yes	No because of no sale	Other no
Gorkha	I	72	Paddy, Millet	21 (29.2)	32 (44.4)	2 (2.8)
	II	104	Paddy, Millet	25 (24.0)	48 (46.2)	25 (24.0)
	III	76	Paddy, Millet	2 (2.6)	51 (67.1)	13 (17.1)
	Total	252		48 (19.0)	131 (51.9)	40 (15.9)
Myagdi	I	49	Paddy, Maize	6 (12.2)	41 (83.7)	2 (4.1)
	II	72	Paddy, Maize	1 (1.4)	67 (93.1)	3 (4.2)
	III	70	Paddy, Maize	3 (4.3)	59 (84.3)	4 (5.7)
	Total	191		10 (5.2)	167 (87.4)	9 (4.7)
Mustang	I	62	Wheat	3 (4.8)	29 (46.8)	39 (62.9)
	II	39	Maize, Wheat	4 (10.3)	18 (46.2)	17 (43.6)
	III	59	Wheat	9 (15.3)	17 (28.8)	93 (55.9)
	Total	160		16 (10.0)	64 (40.0)	79 (49.4)
RCU TOTAL	I	183		30 (16.4)	102 (55.7)	43 (23.5)
	II	215		30 (13.9)	133 (61.9)	45 (20.9)
	III	205		14 (6.8)	127 (61.9)	50 (24.4)
	Total	603		74 (12.3)	362 (60.0)	138 (22.9)

Figures in parenthesis indicates the percentages of sample households in each stratum.

three Rapti districts, this proportion is less than 5%. This result follows the pattern of market participation in these three districts (Table 3.10). Price response, as to be expected, is more likely in areas where market participation is already established.

(ii) Hypothetical Market Access Improvement

6.32 Households were also questioned about their likely responses to hypothesized improvement in market access and transportation in future. Three specific responses were elicited on (a) increased specialization within crop production; (b) increased use of purchased modern inputs even if input prices remain the same; and (c) whether production for the market would generally be profitable. The proportion of households responding "yes" to each of these questions is reported in Table 6.10.

6.33 The response indicated by the sample households to the hypothesized improvement in market access is highly favourable on all three counts. Crop specialization is claimed as the most general response. About 60% of the total Rapti and RCU sample indicate greater crop specialization. There is a 57% favourable response in the RCU zones on the other two items; while in Rapti, this response is slightly less than 50%. In specific districts some proportions are even higher. 86% of the Mustang sample households (including 90% of the MS III households) indicate increased use of purchased modern inputs in response to better market access in future.

6.34 These indicated levels of a positive impact of hypothetical improvements in market access is dramatically higher than the levels implied by the actual change made by

TABLE 6.10 A

RESPONSE TO HYPOTHETICAL IMPROVEMENT IN MARKET ACCESS: RAPTI

Districts/ Market Strata		Sample Size	No. of Households Who Claim Response: Crop Sales Profitable	Increase Input Use	Increase Crop Specialization
1		2	3	4	5
Dang	I	108	75 (69.4)	63 (58.3)	80 (74.1)
	II	59	41 (69.5)	36 (61.0)	42 (71.2)
	III	104	67 (64.4)	49 (47.1)	77 (74.0)
	Total	271	183 (67.5)	148 (54.6)	199 (73.4)
Salyan	I	53	33 (62.3)	35 (66.0)	33 (62.3)
	II	69	38 (55.1)	46 (66.7)	39 (56.5)
	III	74	43 (58.1)	54 (72.9)	42 (56.8)
	Total	196	114 (58.2)	135 (58.9)	114 (58.2)
Pyuthan	I	59	19 (32.2)	24 (40.7)	26 (44.1)
	II	57	29 (50.9)	22 (38.6)	31 (54.4)
	III	74	31 (41.9)	24 (32.4)	35 (47.3)
	Total	190	79 (41.6)	70 (38.6)	92 (48.4)
Rolpa	II	97	40 (41.2)	46 (47.4)	67 (69.1)
	III	101	23 (22.8)	24 (23.8)	53 (52.5)
	Total	198	63 (31.8)	70 (35.4)	120 (60.6)
Rukum	II	53	19 (35.8)	17 (32.1)	24 (45.3)
	III	95	37 (38.9)	35 (36.8)	48 (50.5)
	Total	148	56 (37.8)	52 (35.1)	72 (48.6)
RAPTI TOTAL	I	220	127 (57.7)	122 (55.5)	138 (63.2)
	II	335	167 (49.9)	167 (49.9)	203 (60.6)
	III	448	201 (44.9)	186 (41.5)	255 (56.9)
	Total	1003	495 (49.4)	475 (47.4)	597 (59.5)

Figures in parenthesis are percentages with respect to the stratum sample size (col,2).

these households in the past (discussed in the previous section). One should bear in mind that respondents have a natural inclination to answer favourably to a question which apparently seems to imply rational behaviour. Questions dealing with hypothesized or counter-factual conditions tend to produce uncertain answers in general; but the ambiguity is even greater when they ask whether a seemingly rational response or behaviour would or would not be forthcoming.

6.35 Since the indicated responses are so overwhelmingly favourable, significant inter-stratum differences within a district are not usually observed; and nor do they set any pattern. The largest relative difference occurs mostly with regard to the question of the profitability of sales. This is evident in Rolpa, Pyuthan, Myagdi and Gorkha. There are differences about 20% percentage points between some of the market access strata on this question in each of these districts. For instance 19% of the MS I households (14 in number) of Gorkha claim improved market access would make crop sales profitable. The corresponding proportion in MS II and MS III of Gorkha ranges from 52 to 59% even though actually recorded sales in MS III is limited to only 4% of the stratum sample. The response in Gorkha to the other two questions (increased crop specialization and input use) are also less favourable in MS I than in MS II and MS III. They are also lower in an absolute sense than what is indicated in the other district samples.

6.36 It is curious why the MS I sample households of Gorkha indicate the least degree of responsiveness to hypothesized improvements in market access. An all-weather motorable

TABLE 6.10 E

RESPONSE TO HYPOTHETICAL IMPROVEMENT IN MARKET ACCESS: RCU

Districts/ Market Strata		Sample Size	No. of Households Who Claim Response: Crop Sales Profitable	Increase Input Use	Increase Crop Specialization
1		2	3	4	5
	I	72	14 (19.4)	21 (29.2)	29 (40.3)
Gorkha	II	104	54 (51.9)	49 (47.1)	67 (64.4)
	III	76	45 (59.2)	41 (53.9)	43 (56.6)
	Total	252	113 (44.8)	111 (44.0)	139 (55.2)
	I	49	41 (83.7)	34 (69.4)	36 (73.5)
Myagdi	II	72	38 (52.8)	32 (44.4)	53 (73.6)
	III	70	37 (52.9)	37 (52.9)	47 (67.1)
	Total	191	116 (60.7)	105 (53.9)	136 (71.2)
	I	62	42 (67.8)	53 (85.5)	29 (46.8)
Mustang	II	39	30 (76.9)	32 (82.1)	21 (53.8)
	III	59	44 (74.6)	53 (89.8)	37 (62.7)
	Total	160	116 (72.5)	138 (86.3)	87 (54.4)
	I	183	97 (53.0)	108 (59.0)	94 (51.4)
RCU	II	215	122 (56.7)	113 (52.6)	141 (65.6)
	III	205	126 (61.5)	131 (63.9)	127 (61.9)
	Total	503	345 (57.2)	352 (58.4)	362 (60.0)

Figures in parenthesis are percentages with respect to the stratum sample size (col. 2).

road link to Gorkha district has been recently established. As has been noted before, both of the MS I sample sites of Gorakhkali and Taranagar panchayat lie on this road. There is no apparently overriding reason why sample households in MS I of Gorkha alone should be so pessimistic about the effects of improved marketing and transportation facilities. Could it be that this sample is less sanguine about the benefits of improved market access because they are more realistic, having observed the actual impact of the new road and better market access?

CHAPTER - VII
CONCLUSIONS AND RECOMMENDATIONS

A. SUMMARY AND CONCLUSIONS

7.1 The objective of this study is to comprehend and to quantify the impact of market access and market related factors, such as greater price consistency and price awareness, with farm production and rural incomes within the regions covered by the Rapti Agricultural Development and the Resource Conservation and Utilization projects. Very little is known about the marketing structure -- producer price - production response relationship within either of these areas. The few available studies on agricultural marketing in the context of Nepalese agriculture focus primarily on marketing margins and other "down-stream" activities such as storage and processing. But the primary issue of the extent to which market access and marketing operations directly affect farm production and rural incomes has not been addressed.

7.2 The methodology adopted for the study is constrained by the absence of prior information on marketing channels, product flows and price formation in the study areas. Favourable market access is equated with proximity to large retail market centres without detailed information on the volume of transaction and direction of product flows at various points (nodes) in the marketing/transportation network. Three different type of market access conditions (strata) are identified in six of the eight districts in the study areas; but only two strata are distinguished in Rolpa and Rukum which are the two more undeveloped and remote districts of Rapti zone.

7.3 Independent samples of farm households are selected for survey from each of the relevant <u>a priori</u> market access stratum

in a district. One-way analysis of variance and multiple regression models are utilized to test for inter-stratum differences in household production and income and to measure the proportion of the variance due to market access. Since the sampling design is stratified only on the basis of locationally defined market access, other variables with a location-specific interpretation (e.g. price levels and price consistency) that affect household production and income are analyzed in conjunction with market access.

7.4 This study finds that market access and location-specific factors related to market access produce substantial differences in household production and income within Rapti zone and the RCUP areas. The multiple regression results show a statistically significant favourable effect of market access on gross household production in seven of the eight study districts (with Rolpa as the exception). Location in a relatively more favourable market access strata is associated with as much as a 65 to 67% increase in household production (Gorkha and Mustang). Excepting Rolpa, the lowest significant effect of market access is a 12% increase in household production observed in Pyuthan (page 148).

7.5 The positive impact of market access is general. It increases primary farm production (which includes crops, livestock and the sale of fruits and vegetable) as well as household income from other sources. Both the incidence of other income sources and the average amount of earnings from these sources are higher in sample locationswith favourable market access. Myagdi is the only exception among the eight districts. More than a 100% difference in average earnings from other sources is observed. The sum of the effects on primary farm production and other sources of household income is that total income from all household

activities (net of purchased inputs) is higher in the location having better market access. Among the primary farm production activities, crop production is most sensitive to market access. Similarly, other income from non-agricultural sources (e.g. off-farm employment, retail trade, sales of home-processed goods) is affected more than agricultural other income (from wage labouring and rentals).

7.6 The independent contributions of price awareness and price consistency to farm production is not clearly identifiable. Their effects occur in conjunction with market access because both price awareness and price consistency are closely related to market access. Additionally, the overall degree of price awareness among the sample households is very limited. About 13% of the Rapti and 8% of the RCU households claim they are aware of seasonal price fluctuations. These proportions increase to about 23% on awareness of prevailing market prices prior to sales in both areas. The inter-stratum differences on price awareness is, however, very stark in all eight districts, with price awareness increasing systematically with favourable market access.

7.7 Price consistency is measured as the weighted average of the crop-specific ratios of the maximum-minimum price differential to the average annual producer price in each sample location. Its association with market access is less consistent than that of price awareness. Four of the eight sample districts (Salyan, Rolpa, Rukum and Gorkha) show a substantial reduction in price fluctuation with favourable market access. The overall degree of seasonal price fluctuation is very high. Even the consistency ratio in the lower range show a 20-25% annual variation, with some locations recording more than 80% seasonal price variation for specific crop (Table 6.4).

7.8 The magnitude of the effect of market access on household production and income is not uniform in the districts of the study area. The largest relative differences in production and income between areas with and without market access are seen in Dang, Mustang and Gorkha districts. These three represent the more advanced and prosperous districts where average production and income are higher. The effect of market access is less significant in the poorer districts - such as Rolpa and Myagdi.

7.9 Part of the reason for the more significant impact of market access in Dang, Gorkha and Mustang is that market access is more differentiated in these districts. The relative market access position between, say, Ghorahi and Goltakuri in Dang or between Gorakhali and Barpak in Gorkha is more extreme than between the stratum I and stratum III sites for Salyan, Pyuthan and other districts. Naturally, precise comparison is not possible without an absolute scale with which to measure market access. Another explanation, though related, is that these three districts are economically more prosperous than the others. Dang is in a separate class because it is a surplus producing inner-terai district. In general, this pattern is consistent with the expectation that the market access-production relation will be more clearly established in areas or regions where households already have a minimum level of productive resources.

7.10 Looking at the underlying causal (or intermediary) factors through which market access boosts household production, the favourable locational effects of market access are observed irrespective of actual sales or market participation. The pure market participation effect of market access whereby household production and income are increased because of the opportunity

to buy and sell at favourable prices is not as expected. Easy and cheap access to modern agricultural inputs is the more consequential aspect of market access than the opportunity to sell farm output at more remunerative prices.

7.11 Only about 17% of the RCU households and 12% of the Rapti hill households report any crop sales (as compared to 56% in Dang). The corresponding proportion even among large farmers only is about 20% in the Rapti Hill districts and 28% in RCU. Similarly, sales of livestock products are reported by 17% of all Rapti and 19% of RCU households. Fruit and vegetable sales are limited to less than 6% of the sample household in both cases. The average value of sales of primary farm products is highest in Dang and Mustang (Rs. 1266 and Rs. 1146 per household, respectively). Gorkha and Rukum have intermediate average sales values. But in the other districts, average sales revenue is about Rs. 200 or less per household (Table 5.7). The incidence of barter exchanges is also very limited. Only 39 households in the total sample of 1003 report barter exchanges, of which 22 are in Rukum.

7.12 The incidence of sales of primary farm products and the average value of sales is generally higher in the locations with a more favourable market access - i.e. those situated near or in the large district bazaars or headquarters. One cannot conclude, however, that the absence of retail outlets or a physical market place depresses the incidence and value of sales in the other less favourable market access strata.[1] Sales are limited because the productive resource base (e.g.

1/ Even the remote sample panchayats are served by retail shops and other outlets that buy and sell farm products. In the total 55 sample panchayat locations, 49 have a "market" (however small or inconsequential) within a day's walk and back (Table 3.8).

land size and livestock holdings) are limited; and most households are net-deficit in food. The usual mode of sales for almost all households, irrespective of their location, is on-site sales to neighbours or local final consumers. The prices for local sales are oftern higher than the prevailing prices in the main district market centers. Even in Dang, sales in a market place is restricted to only 36% of the households reporting sales.

7.13 Producer prices can normally be expected to be higher in locations identified to have better market access. But this association is not observed in the study. In fact there is no clear pattern to the distribution of producer prices. About 42% of the pairwise comparison of crop-prices in Rapti are in the expected direction of higher prices in better market access location, and the bulk of these cases occur in one district, Rukum. The corresponding proportion in RCU is higher at 62%, but the differences are usually very small.

7.14 An even anomalous result is that, irrespective of the association with market access, the effect of local producer prices on household production is ambiguous. This is the case in Rapti. In the RCUP districts, the regression equations of household production show that higher local prices significantly affect household production in the expected direction. But in Rapti, the price coefficients are either insignificant or even significantly negative in the case of Salyan and Rolpa.

7.15 The latter two cases are not to be intrepreted as a "perverse" relationship between prices and supply. The negative coefficients may occur due to aggregation errors.

Samples from locations with different local prices but not connected by a common marketing network have been grouped together. The appropriate conclusion is that marketing structures are fragmented and that local supply and demand conditions can vary drastically even within short distances. The expected role of producer prices which is confirmed in the RCU districts is consistent with the market fragmentation argument. Compared to Rapti, the marketing network in the RCU district is more uniform, following a clearly defined route or even a single north-south trading orientation as in the Kaligandaki Valley.

7.16 There is no direct evidence for greater specialization induced my market access. Cropping rotations are fairly uniform within the district samples except where it is affected by ecological factors and the type of land. Paddy is the preferred crop whereever it can be grown; and it is always traded. Local sales to neighbours or to travelling traders is the predominant mode of exchange except in Dang. But most households in the hill districts also cultivate crops like barley and millet primarily for home consumption because these crops are very infrequently traded. The small proportion of households who report any crop sales even within stratum I samples in the hill districts testifies to the low degree of specialization. Only 30% of stratum I households of Rapti districts and 23% in RCU report any crop sales.

7.17 The most consistent relationship with market access occurs with respect to input use. Though the overall rate of adoption of improved seed varieties and chemical fertilizers is low, it is concentrated in areas with favourable market access. Use of chemical fertilizers is limited to about 17% of the Rapti sample (with only 8% in Rolpa and

Salyan) and to about 25% of the households in the RCUP areas (with 10% only in Myagdi). But the corresponding proportion in MS I is 35% (Rapti) and 47% (RCU) in contrast the 4% (Rapti) and 3% (RCU) in MS III. The overall use of improved seeds is slightly better than chemical fertilizer - about 37% in Rapti and 32% in RCU. This proportion also ranges from 41% (Rapti) and 52% (RCU) in MS I to 25% and 15% in MS III, respectively (Table 3.16).

7.18 The relationship of market access and input use extends to the availability of production credit from institutional sources; and also to the farm operator's "management" input. This latter category is defined as an index of several characteristics, such as consultation with agriculture extension workers, listening to the agricultural program in the radio etc. It is likely that important qualitative differences also occur in the use of agricultural inputs due to favourable market access.

7.19 The net effect of the inputs variation is reflected in the total cost of cultivation (purchased inputs, including hired labour) per ropani of net land cultivated area. The average cost of cultivation in MS I is statistically significantly higher in four of the eight sample districts. (Table 3.18)

7.20 The greater input use in the more favourable market strata reflects primarily easier and cheaper availability of these modern inputs. The joint effect of favourable market access, operating at both the input and output levels, is to increase the intensity of cultivation. Sales opportunity increases production through higher intensity of cultivation. But higher intensity also occurs irrespective of market sales because favourable market location facilitates access to these inputs. Such a relationship presents strong evidence for a "vent for surplus" mechanism operating in Nepalese agriculture.

2/ These figures are not to be compared in an absolute sense with Baseline estimates because the present study has over-sampled large farmers relative to the Baseline.

7.21 The likelihood that price policy interventions alone will succeed in realizing the potential increased production is small. The irregular spatial distribution of producer prices points to isolated fragmented localities where prices are not determined in relation to a common marketing network. Fragmented markets mean that the effectiveness of national or even regional price policies will be severely limited. Official efforts to set higher producer prices (or repealing measures and subsides which currently depress them) may filter only marginally to the actual producers. For instance, the benefits derived from a higher purchase price by the Nepal Food Corporation (NFC) or the lifting of restrictions on exports is likely to be appropriated by the secondary and final market dealers - wholesalers, mill-owners, export houses, etc. These markets are controlled by oligopolistic elements and such a market structure is in turn supported by market fragmentation and transportation bottlenecks.

7.22 The price policy option must also be carefully assessed from the perspective of the resulting welfare gains. Most households in the hill districts of Rapti and RCU are producers as well as consumers (purchasers of food grains). Higher prices will affect the real income of these households. The welfare gains of increased production may outweigh the losses from reduced real income on <u>average</u>; but for certain target groups - the landless, naturally, but even for small farmers - this may not be true.

B. RECOMMENDATIONS

7.23 The major policy implication that emerges from this study is that agricultural growth and increases in rural incomes within Rapti zone and the RCUP areas is more efficiently achieved by concentrating on investments which directly increase the quantity and quality of agricultural inputs. Major investments in marketing infrastructure and innovations in price and marketing policies logically follow after, and not precede, a sustained effort to increase production through a technological input-output relationship by expanding access to an adoption of modern inputs and cultivation techniques. Marketing and price interventions are important because they help technological adoption and diffusion. But this process must also be fostered through greater direct interventions in the supply of inputs, agricultural extension and innovations in farm management practices.

7.24 For the sample households in the Rapti and RCU districts, the lack of an opportunity to sell farm output in an external market at remunerative prices is not a critical problem. The poor resource base of these farmers coupled with the traditional methods of cultivation producees very few households who are net sellers of food grains. Only about 41% of the sample households in Rapti and 37% in the RCU areas had sufficient production for family consumption (Table 3.11). In the context of overall food deficit in the hill and mountain districts of the study area, local sales to neighbours or other traders, often at prices higher than in the main district bazaars, is a viable means of output disposal for those few households who are surplus producers.

7.25 In the hill and mountain districts of the study region, increased production, especially of food crops, can be profitably absorbed locally in the short run. One excepts, that

excluding the terai districts, a similar condition holds in most of the hill and mountain districts of Nepal. Even Dang, an inner-terai district, is not an exception. Though it generates a marketable surplus of food crops this production is likely to be concentrated among a small proportion of the cultivators - mainly the very large landowners. The agrarian structure of Dang has a very unequal distribution of land ownership. More than 40% of the baseline households were sub-marginal, and more than 70% cultivate less than 1 hectare (Table 1.2). An unfavourable market access concerning the sale of crops is unlikely to be a very important constraint on production for these households. Households that earn a large part of their income from agricultural labouring receive some indirect benefits of market access through an increased demand for labour,if labour markets are competitive. But for the bulk of the marginal land cultivators, their income will be more immediately affected by a greater earnestness about implementing and extending current land reform legislation.

7.26 These groups of small-scale producers in Dang as well as in the hill districts are likely to be by-passed by marketing and price policy interventions designed with the main purpose of increasing the volume of the marketable surplus to be sold to urban consumers or traded inter-regionally or as exports. This can be partially prevented by designing target group specific price and marketing policies - e.g. discriminatory pricing or subsidies for inputs. But such policies are difficult to administer without a great deal of "leakage" away from the intended beneficiaries. On the other hand, it is ill advised to formulate policies that have sector-wide implications when the intended purpose is to benefit or isolate specific sub-groups of producers. It creates distortions which affect resource allocation in other activities and sectors of the economy.

7.27 It is recommended that the problems of the small-scale producers in the Rapti and RCU areas be viewed from a more

integrated income policy approach, taking into account their role as both producers and consumers of farm output. A concerted effort to push technological innovation among this group must be made. The result is not only increased production but also direct welfare gains through increased consumption levels of these target groups. A large portion of the extra production will be retained for family consumption and these welfare gains occur without substantial marketing and transportation related infrastructural investments.

7.28 Another aspect of such an approach is to increase opportunities for local off-farm employment. At the prevailing levels of income, off-farm employment has a direct impact on the demand for food because of a high income elasticity. Any programme which increases the local effective demand for farm products would have a favourable impact on production, again without the large scale infrastructural investments.[3/] The viability of non-traditional off-farm employment and its impact on traditional agriculture through effective demand (price) we well as structural factors merits closer scrutiny.

7.29 The inadequacy of the existing marketing infrastructure must also be directly addressed. The problem is more critical from the point of view of distributing agricultural inputs. Investments in transportation, storage, and the development of rural markets will certainly reduce the marketing problems currently faced by producers. The subjective answers elicited in the survey on the likely response to hypothetical improvements in market access suggest a general favourable impact in all districts (Table 6.10). These infrastructural investments, however, require substantial public-sector resources. The

3/ Actually the marketing problem is not obviated in this situation, but merely transferred from that of marketing agricultural products to marketing whatever product is produced through off-farm employment. But the latter problem may be less complicated if these products are judiciously chosen.

question arises whether such investments are the best use of scarce public resources if the ultimate aim is to generate a broad-based and significant increase in rural incomes.

7.30 The marketing function assume an increasingly important role as agricultural production responds to the effective demand generated through increased off-farm demand for agricultural products, whether of final consumers in urban areas or the intermediate demand of industries. The possibility that such a volume of demand will be generated within Rapti zone and the RCU areas even over the medium term is not favourable. Furthermore, since transportation in and out of the hill and mountain regions of Nepal will always be very difficult and costly, the prospects for gains through inter-regional specialization and trade are also dim.

7.31 Transportation and the distribution network of agricultural inputs should be bolstered directly, with additional subsidies if necessary. Special programs are needed to provide these inputs in the remote districts without a transportation link - such as Rukum and northern Rolpa. But the development of an advanced, high performance marketing network - i.e. a system with an integrated series of channels which purchases and assembles small seasonal surpluses of numerous small farmers and transports them to outside locations for processing and storage, and then, reintroduces them in the producing region as processed food - is of limited relevance in the context of general food scarcity in Rapti and the RCU areas. It is recommended that a more "inward-looking" marketing structure should be developed which fosters specialization and trade within local communities.

7.32 Major innovations in prices and marketing policy interventions must await a clearer understanding of the actual incidence and distribution of benefits that result from them. Experimental alterations in marketing and price policies in Rapti and RCU or "fine tuning" adjustments on a district specific basis cannot be recommended. Even if a favourable production response is observed in the aggregate, the magnitude of the final impact on real rural incomes remain uncertain. The resources committed through such interventions may not be justifiable if the benefits are very unequally distributed first, between producers and secondary market traders and wholesalers; and secondly, between large and small producers.

7.32 To review, the general policy level and specific recommendations made are as follows:

(1) Increase agricultural production and rural incomes by concentrating on improving the technology of agricultural production - i.e. adoption of modern inputs and cultivation practices. An increased effort is required in both the distribution of modern inputs and in agricultural extension.

(2) Focus on technological improvement in the production of the main food crops - paddy, maize, millet - particularly among small farmers. Extra production in food crops can be locally absorbed through extra consumption over the short run in both Rapti and RCU areas, without recourse to exterval or inter-regional markets.

(3) Agricultural investments and programmes designed for a distinct regional pattern of production and specialization with inter-regional trade (e.g. livestock specialization in northern Rapti or horticulture specialization in Mustang) is not advisable. Specialized production cannot be supported by local demand and transport costs are and will remain inordinately high.

(4) Transportion should be improved from the point of view of facilitating local intra-regional marketing and trade. Local market integration can be improved by small scale investments on the main trail networks instead of large scale investments for road construction.

(5) Programmes designed to increase off-farm employment will have a favourable impact on food production by stimulating local effective demand.

(6) Increasing the rate of adoption of the modern inputs (HYV seeds, chemical fertilizers) is critical. The study finds that local availability is the chief constraint to adoption. Agricultural inputs are currently distributed by public sector agencies through their own outlets and through local co-operatives (Sajha). This network is not effective and it probably cannot handle increased flows even if revamped. Alternative channels of distribution, including private sector responsibilities must be explored and adopted.

(7) The net impact of pure price policy intervention which seek to increase producer prices within Rapti and the RCU area is ambiguous. It is an important issue that requires detailed further study. There are three separate concerns: a) the determinants of local producer prices within the study area and their connection, if any, to a common marketing or distribution network; b) the structure of marketing channels and price margins at various stages with which the relation between producer prices and final market prices and the extent of a "trickle-down" can be analysed; and c) the income - redistributive effect of price policy even within the rural/agricultural sector.

(8) Discriminatory price and marketing policies which apply to specific targeted groups of producers are not advised. Leakages abound, and subsequent distortions occur in other sectors and activities. Specific regions however, should be singled out for preferential treatment because of remoteness or a generally poor resource base.

(9) High seasonal price fluctuation is a critical problem. Apart from the effect on production, price variability is undesirable from a welfare point of view because small-scale producers are sellers when prices are low (in the after-harvest period) and buyers when prices are higher. Large-scale buffer-stocking operations are not feasible, but efforts should be made to increase on-site storage of grain through modern but cost-effective methods to improve the holding capacity of the producers.

(10) A large scale organized effort must be mounted for the collection and dissemination of agricultural producer prices. This information is important for both the actual producers as well as for policy analysts. At present, the Department of Food and Agricultural Marketing Services collects only final retail prices for a few major towns. Producers prices should also be collected and a lot of attention given to local dissemination to improve the price awareness of producers.

APPENDIX A

I. SAMPLE DESIGN AND PROCEDURES

1. The sample design for this study was based on the following stepwise procedures.

(i) Review of market access conditions and relative variation within the concerned districts

(ii) Allocation of the approximate 1600 household sample size (1000 in Rapti and 600 in RCU) to each district

(iii) Identification of market access stratum within each district and purposive selection of sample panchayats

(iv) Random selection of wards and allocation of sample size for each selected sample location

(v) Random sampling of the relevant population from with the ward(s) population.

2. The review of market access conditions in the Rapti districts was based on the marketing component section of the Rapti Zone IRDP Feasibility Study. Three market access strata were identified for each district. Stratum I consists of areas located within the panchayat boundaries of the main retail market centre in a district. This is usually the district headquarters. Stratum II represents areas near secondary markets or served by road transportation. Stratum III is the residual category of generally poor market access. A similar three-way distinction is made for the RCUP areas also. In Mustang and Myagdi it represents the traditional traderoute orientation of the Kaligandaki Valley. In Gorkha, the stratum distinction is made on the basis of road access and proximity to the district and terai markets.

(i) District Sample Size

3. Independent information on the variation in market access characteristics within a district is not available. It is assumed that the extent of this variation is reflected by the household population of each district. In other words, the most populous districts (viz. Dang and Gorkha) in terms of households are assumed to have the greatest relative difference in market access among the panchayats located in that district. Accordingly, the sample size and (number of sample locations) is allocated to each district according to the household population. As indicated in Table A.1, this proportionality with estimated household population size is maintained only on an approximate basis.

(ii) Selection of Panchayats in Each Market Access Stratum

4. The sample panchayats in each market access stratum were chosen purposively. In the case of market stratum I, district headquarters and panchayats which had the major retail market centers of the district within their boundary were picked. In the case of market strata III a minimum of 3 panchayats were picked to represent this stratum adequately. Some new panchayats in all the market strata are added to the Baseline list of sample panchayats. The panchayats selected for each strata in all districts are indicated in Table A.2.

5. Compared to the Baseline Survey, new panchayats are added in most of the market access stratum to get a better representation of areas with favourable market access. Tulsipur in Dang and Bijuwar in Pyuthan are very important market centres. In Rolpa and Rukum there would be no representative of favourable market access without the new additions.

Since the Baseline Survey of RCU captured even less market acces variation, the RCU area sample panchayats include more independent selections.

(iii) Stratum and Panchayat Sample Size

6. The sample size for each market access stratum was assigned independently. An independent size is allocated because no prior information could be generated about the number of households served by a particular market, or more importantly, the number of households with a common type of market access in a given district. The stratum sample size reflects the number of sample panchayats selected within a stratum, because a minimum of 20 households were to be picked from each sample panchayat. There, however, is no uniformity in the sampling rate. Since there are fewer sites with favourable market access (MS I and MS II), these are relatively over-sampled in comparison to MS III sites.

7. The sampling procedure within each market access stratum reflects an approximate proportional to size (PPS) procedure. Firstly, the panchayat was considered too large and too heterogeneous to serve as the final sampling unit. Every village panchayat consists of nine wards excepting Ghorahi which is a town panchayat. In most cases, one ward was selected randomly. In other cases the ward populations are so small that a PPS allocation of the stratum sample size would lead to a more than 50% sampling rate of the ward population. In such cases, two (and even more) wards were selected randomly for the survey. Finally, in the case of the MS I sample sites, two or three wards were initially selected and the survey supervisors had the flexibility to pick the ward(s) reflecting the most

favourable market access. This was done to avoid picking wards which were located in the bazaar areas where agricultural production may not be the primary source of income. Secondly, market access positions within a panchayat boundary can vary substantially (e.g. across rivers or difficult terrain). Since the MS I sample was to represent the most favourable market access within a district, the ward selection for MS I could not be done randomly from an off-site location. Three wards initially distinguished from which the survey supervisor was to choose the final sample.

8. The number of households within each of the selected (and optional) wards was compiled from the Electoral List of the Election Commission prepared for the 1982 local panchayat elections. The total sample size of a particular district market access stratum is allocated to these selected panchayat (wards) on a approximate proportional to size basis. When two or more wards are selected, the allocation is based on the total household number of the relevant wards. Where a choice in the final ward selections existed, the size allocation is made on the basis of the average ward size.

(iv) Selecting Households from Within the Ward(s)

9. The population relevant for sampling within a ward is taken as the number of households with a minimum size of land cultivation. A land cultivation limit is imposed to restrict the survey to households with an agricultural base of income of a sufficient size so that the effects of market access may be clearly observed. The working hypothesis (though unverified)

is that differences in market access has a stronger impact on resource allocation and production within a sample of large farmers than the effect that a similar market access difference has among marginal farmers. Initially, a minimum land cultivation of 4 ropani (the Baseline definition of sub-marginal house holds) was selected as the cut-off point. But on-site observations showed this limit to be extremely restrictive in Mustang and some of the MS III sites in Rapti. An alternative land size limit was assigned in "cleaning" the data after the survey (see Sec. II. of this Appendix).

10. At each survey site, the household list of the relevant wards from the 1982 panchayat elections was updated in consultation with the local panchayat officials for changes in the number of households. Information about the size of land cultivation was not asked at this time. A random selection of the pre-specified number of households was made from this list with the use of cards. When these selected households turned out to have less than 4 ropani of land cultivation, the interview was terminated and an alternative household selected. In Mustang and Rukum, supervisors did not find the 4 ropani limit feasible and so households with a minimum of two ropani were included in the survey.

11. One of the survey instruments was a village-level questionnaire with information on general characteristics, market access and transportation conditions of the selected sample sites. This was filled in by the survey supervisor himself through an interview with a local panchayat official or an accepted village elder. The household questionnaires were administered by a team of 5 or 6 enumerators under the guidance of a survey supervisor.

II. SAMPLE ADJUSTMENTS AND DATA EDITING

(i) Adjustments in Market Access Strata

12. After the survey of each district was completed the degree to which the sample sites conformed to the expected market access characteristics was reviewed on the basis of the village level questionnaire and the non-structured information and impressions of the survey supervisor during the field work. When the sample market access strata were identified prior to the survey, sufficient information on the range of differences between different sample sites was not available. If necessary, adjustments were to be made to ensure the relative compatability of market access characteristics of sample sites within a district. A second but also important consideration was to ensure some degree of inter-district compatability of market access strata - i.e. to not have very large differences in the market access characteristics of sample sites in, say, stratum II of one district as compared to the same stratum in another district.

13. Naturally, this cannot be done with great precision because the multi-dimensional characteristics of market access cannot be easily reduced to a single absolute index or score. Apart from Dang- which stands as a special case because it is the only inner-terai district in the sample - it was perceived that some compatability, though of an ad hoc nature, could be enforced for the remaining seven hill districts. From this perspective, four changes in the initial market access classification were made:

a & b The classification of market access stratum I was dropped for Rolpa and Rukum. The sample site selected in both of these cases was the respective district headquarters - Liwang and Musikot. But the size and variety of the local retail market in these two sites did not compare well with the other stratum I sites in Salyan and Pyuthan. This is consistent with the relatively greater backwardness of these two districts in Rapti zone. Liwang is placed in stratum II (with Khungri) in Rolpa; as is Musikot (with Chaurjhari) in Rukum. Consequently only two market acces classes (strata II and III) are identified in both of these districts.

c. Additionally in Rukum, Syalapakha was changed from market access stratum II to stratum III. With Musikot now being placed in class II, the relative difference between it and Syalapakha is too big to classify them in the same group.

d. In Pyuthan there were two sites initially in stratum I Bijuwar and Pyuthan Khalanga. Bijuwar was known to be the bigger and more important market centre for Pyuthan. Khalanga was also placed in this group by virtue of its being the district headquarters. But Bijuwar turned out to have a much more developed marketing structure than Khalanga. So the latter site was placed in stratum II along with Tiram (located on the road linking Pyuthan to Ghorahi in Dang).

14. It is not proper normally to make changes in the classification of sampling strata after the survey. Such changes affect the randomness of the selected sample. The reason why changes in the group classification of sample households is improper is not that post survey information is per se invalid in assessing and modifying the initial methodology. Rather, the problem occurs because in a stratified random sampling framework it alters the probability with which the particular sites were selected initially. Secondly, changes in the strata classification alter the final sample size in each stratum on which the statistical analysis is based. If

a probability proportional to size (PPS) sampling design was used to determine sub-sample sizes with the purpose of estimating certain average characteristics of the total sample (e.g. at the district level) than changes in the stratum sample sizes will affect the relative weights attached to the different groups and, hence, the value of the aggregate sample estimate.

15. These problems, however, do not occur in our case. The purpose of the analysis is not to generate district averages from a sample stratified on the basis of market access. Site selections were not made by a random selection of the possible panchayat falling into each market access stratum. They were picked purposively on the basis of the expected relation contrasts in market access within a district from a pre-selected list of panchayats. The sample sizes for each market access strata in a given district is not based on PPS but determined independently. Size considerations were relevant only in selecting the ward and household level sample for the various panchayats within a stratum. This is done to ensure the representativeness of the sample within the panchayat population. This representativeness of the selected wards households is not affected whether a particular site is placed in stratum I or II.

16. One problem that, however, may occur even in a purposive sample design when the stratification is changed is that of an insufficient final sample size in a particular stratum. The sample size in the initial stratum may be reduced to the extent (e.g. less than 30 households) that statistical inference on the difference in stratum means is not meaningful. In the

present context, this problem also does not arise because the final sample size exceeds 50 households in all cases where stratum adjustments were made. (The smallest sample size in any market access stratum in the entire survey is 39 households in MS II of Mustang).

(ii) Changes in Selected Sample Size

16. Further adjustments in the sample size of specific panchayats and the corresponding market access strata were also made on the basis of a minimum cut-off point for the size of land holding. The initial limit for land cultivation of less than 4 ropani appeared to be too restrictive. The survey team for Mustang had been instructed prior to the survey to set a lower limit of 2 ropani. (In Mustang, this limit as well as the general measurement of land holding was confined to land given to crops; it excludes land use as orchards). Several cases of land cultivation of less than 4 ropani also turned up in the samples for the other districts. Furthermore, a procedural ambiguity arose in the case of households cultivating less than 4 ropani, but who received rental income on other land rented out to tenants.

17. To tackle this issue and also to maintain an uniform cut-off point for all districts (except Mustang), a new land size limit was defined in terms of a composite index of land cultivated and land rented out. An effective land size index (Z index) was computed as the sum of land cultivated and 50% of land rented out - on the presumption that the usual rental share is 50%. All households with a Z value of less than 3 ropani were dropped from the final sample on which the analysis is based. The largest number of dropped cases occurred in Rukum - 23 households.

18. Some sample households were dropped for another reason also. The survey areas of Rapti zone and the RCU districts are not known to be areas of heavy recent in migration. But for households that had settled in their present location within the last two years, the survey reference period of January 1981 to December 1982 would have represented their first complete cropping cycle. It was assumed that the production and income information for these households would not be representative of their respective location in any of the market access strata. Fortunately only three such cases of in-migration within the last 2 years were reported in the survey; and these three were dropped from the final sample selected for analysis.

TABLE A.1

SAMPLE SIZE BY DISTRICT

Districts	% Share of Households: Baseline Population	% Share of Households: Sample Allocation	Desired Sample Size	Assigned ~~Sample~~ Size a/	Final Survey Sample ~~Size~~ b/
Rapti					
Dang	24.8	26.5	265	275	271
Salyan	21.	19.5	195	205	196
Pyuthan	19.2	18.5	185	195	190
Rolpa	21.6	19.5	195	205	198
Rukum	13.3	16.0	160	170	148
Rapti Total	100.0	100.0	1000	1050	1003
RCUP	Electoral List Household Population +				
RCU Total	100.0	100.0	605	625	603
Gorkha	69.88	41.3	250	260	252
Myagdi	21.32	31.4	190	195	191
Mustang	8.79	27.3	165	170	160
Grand Total	100.0	100.0	1605	1675	1606

+ Compiled from the Election Commission's list of household heads prepared for the 1982 local panchayat elections.

a/ This represents the sample size planned in the survey schedule with the expectation that a certain number of questionnaires would be invalid. Thus the desired sample size is adjusted upwards by about 5%.

b/ The size of the final sample actually included in the data analysis after all data editing and dropping of invalid cases. These adjustments are described in section II of this Appendix.

TABLE A.2

SAMPLE SIZE AND SELECTED PANCHAYATS

BY MARKET ACCESS STRATA

Districts		MARKET ACCESS STRATA MS I	MS II	MS III
Dang	N Panchayats	112 Gorahi Tulsipur*	61 Manpur Sonpur	102 Rajpur Goltakuri+ Hansipur*
Salyan	N Panchayats	60 Khalanga	70 Kajeri Phalabang	75 Ghajaripipal Sivarath Badegoan
Pyuthan	N Panchayats	87 Bijuwar* Khalanga	28 Tiram+	80 Syaulibang Lung Baraula
Rolpa	N Panchayats	65 Liwang*	33 Khungri*	107 Mirul, Dubidada Harjang Iriwang*
Rukum	N Panchayats	38 Khalanga*	57 Syalpakha, Chaurjhari	75 Athbisakot Barayala Magma*
Gorkha	N Panchayats	74 Gorakhakali Taranagar	108 Deurali* Amppipal* Taklung* Bunkot*	78 Swanra, Jaubari, Barpak*
Myagdi	N Panchayats	55 Ghatan* Pipale*	70 Sikha, Dana Begkhola	70 Kuinemangale* Narchyang* Pakhapani*
Mustang	N Panchayats	67 Marpha Jomsom	41 Lete* Kunjo*	62 Muktinath* Kagbeni* Jhong*
Total Sample Size		558	468	649

Note: N is the number of households in the sample size assigned for each market access stratum by district.

* New additions to the list of sample panchayats surveyed for the Baseline Survey.

\+ Assumed to be one of the Baseline panchayats which has been renamed.

TABLE A.3

SELECTED PANCHAYATS, WARDS AND SAMPLE-SIZE BY MARKET STRATA

Districts	Market Strata	Selected Panchayats and (wards)	Assigned Sample Size	Final Sample Size
Dang	I	Ghorahi (2,11)	71	68
		Tulsipur (8)	41	40
	II	Sonpur (1)	29	28
		Manpur (5)	32	31
	III	Rajpur (8)	40	41
		Hansipur (2)	36	37
		Goltakuri (3)	26	26
Salyan	I	Khalanga (4,6)	60	53
	II	Phalabang (7)	35	35
		Kajeri (1)	35	34
		Sivarath (3)	20	19
	III	Sivarath (8)	27	27
		Ghajaripipal (6)	28	28
Pyuthan	I	Bijuwar (4,6)	57	59
		Khalanga*(5)	30	29
	II	Tiram (1)	28	28
		Baraula (8)	30	26
	III	Lung (5)	25	24
		Syaulibang (1)	25	24
Rolpa	I	Liwang* (3,8)	65	65
	II	Khungri (2)	33	32
	III	Dubidada (5)	27	26
		Mirul (2)	23	19
		Harjang (2,4)	32	31
		Iriwang (1)	25	25
Rukum	I	Khalanga* (1)	38	32
	II	Chaur jhari (3)	28	21
		Syalapakha** (3)	29	29
	III	Magma (3,9)	24	18
		Garayla (1)	29	26
		Athbisakot (6)	22	22

TABLE A.3 (contd)

SELECTED PANCHAYATS, WARDS AND SAMPLE SIZE

Districts	Market Strata	Selected Panchayats and (wards)	Assigned Sample Size	Final Sample Size
Myagdi	I	Ghatan (8)	27	25
		Piple (1)	28	24
	II	Begkhola (4)	20	20
		Dana (4)	20	20
		Sikha (4)	30	30
	III	Kuinemangale (1,2)	22	20
		Narchyang (7,8)	20	20
		Pakhapani (2,7)		
Mustang	I	Jomsom (2,3,4,)	31	30
		Marpha (1,2,3,)	36	32
	II	Kagbeni (7,8)	21	21
		Muktinath (1,2,4,5,7,8)	21	20
		Jhong(4,5,6,7,)	20	18
	III	Lete (6,7,8)	20	19
		Kunjo (4,5,6,)	21	20

Note: * Changed to MS II from MS I after survey

** Changed to MS III from MS II after survey

APPENDIX B

DERIVATION OF AGGREGATE PRODUCER PRICES AND PRICE CONSISTENCY RATIO

(i) Aggregate Crop Producer Prices (CPI)

1. The aggregate producer prices (CPI) reported at the level of a market access stratum in Table 3.14 in Chapter III represents the combined effect of two different levels of aggregation. They are:

(a) aggregation of the after-harvest producer prices of the major crops grown in the concerned district to derive an aggregate crop producer price for each survey location (panchayat).

(b) aggregation of the panchayat specific CPI over the several sample locations defined for a particular market access stratum.

2. The aggregation over crops noted in (a) is done for the after-harvest prices of the major crops rather than for an estimated average (annual) producer price for the survey reference period. The after-harvest price is the appropriate choice for evaluating the value of crop production and farm/household income and also for analyzing differences in household production decision. On the other hand, for the purpose of evaluating the favourable effects of market access on producer prices, it might seem more relevant to define an aggregate CPI based on an annual average producer price of each crop. Seasonal price fluctuation in under-developed agriculture can be very large and affect farmers decisions independently of the level of after-harvest prices. The estimation of an average annual producer price, however, raises complex problems of its own.

3. Information on the prevailing producer prices for the major

crops grown in a particular district was collected in the panchayat level questionnaire. This questionnaire was designed to capture the seasonal fluctuation in producer prices by month from the beginning of the survey reference period (Poush 2037 or December/January 1982) to the survey date. The local panchayat official or a village elder was the usual respondent to the panchayat level questionnaire. The survey supervisors claimed that these respondents often had major recall problems concerning producer price changes by month during the reference period. Also, the extensive nature of the survey involved in this study precluded a more detailed investigation and estimation of average producer prices reflecting the seasonal volume of transactions at the local village level or other nearby important market centres.

4. Because of these factors, the estimation of an annual average producer price involves a large degree of unreliability. Computing an aggregate CPI on this basis would add another degree of aggregation over time in an annual cropping cycle with possibly large errors in an unknown direction. Consequently, the CPI has been estimated on the basis of after-harvest prices. An annual average producer price (which is used to measure price consistency) is computed in a very approximate manner as the simple average of the following prices (a) the after-harvest price; (b) the price 6 months after-harvest; (c) the maximum price in the last 12 months; and (d) the current producer price.

5. The aggregation of producer prices over several crops for a specific sample location is done as a weighted average of the after-harvest prices of pre-specified major crops grown in each district. The crops used are paddy, maize, wheat, millet, oilseeds, barley, pulses and pototoes in the six hill districts of the study area. Paddy, oilseeds and millet are

not relevant in Mustang because they are not grown in the sample locations; instead phaphar (buck-wheat) and uwa (naked barley) emerge as important crops. Millet also is not relevant for the CPI computation in Dang along with barley.

6. The crop specific weights are based on the area given to cultivation of these specific crops in each district. The crop area estimates are taken from the respective Baseline Survey and the area statistic published by the Department of Food And Agricultural Marketing Services (FAMSD). The crop-specific weights vary across districts because cropping patterns are different. But the same district level weights are used to compute the CPI for all sample panchayats within a district even though the actual importance of specific crops will vary by location within the district. The same weights are imposed to avoid spurious differences in the aggregate CPI across market access stratum which may arise simply from a varying crop-composition effect. The area weights attached to the relevant crops by district are given in Table B.1.

TABLE B.1

CROP-SPECIFIC AREA WEIGHTS USED IN COMPUTING CPI

(in percentage[b])

Crops:	Paddy	Maize	Wheat	Oilseeds	Millet	Barley	Potatoe	Pulse
Districts								
Dang	46.3	26.8	8.9	10.1	n.r.	n.r.	2.3	5.5
Salyan	23.8	29.4	20.8	n.r.	15.8	2.7	7.5	n.r
Pyuthan	27.4	44.9	16.9	"	5.7	0.4	4.6	"
Rolpa	9.1	45.8	17.1	"	4.9	3.6	19.5	"
Rukum	14.0	43.2	23.1	"	2.2	4.9	12.6	"
Gorkha	31.0	34.9	6.3	"	8.2	0.9	18.7	"
Myagdi	26.1	51.6	6.0	"	4.6	1.2	10.4	"
Mustang	n.r	22.8	20.2	"	n.r	22.5	22.5	10.5[a]

a/ This is Phapar (buck-wheat) in Mustang; and the weight given to wheat in Mustang reflects the share of Uwa (naked barley) also.

b/ The percentage may not add up to 100 due to rounding.

n.r implies this specific crop is not generally grown in the concerned district and in these cases it has been assigned a zero weight.

7. Finally, the aggregate CPI computed for each market access stratum within a district is computed as the simple average of the CPI for the different sample locations within each market access stratum of a district. For instance, the CPI reported for MS I in Dang in Table 3.14 represents the simple average of the CPI for the two sample location in MS I of Dang — Ghorahi and Tulsipur panchayats. Since there are always more sample locations in MS III compared to MS I and MS II, this level of aggregation is most extreme for the aggregate CPI computed for MS III.

8. The after-harvest producer prices for each major crop for all the sample panchayats are noted in Table B.2A and B.2B, along with the panchayat level CPI. One should note again that the estimates of household production and income in Chapter IV and V is based on evaluating farm production at these after-harvest prices (and not on the annual average producer price for a particular crop).

(ii) Price Consistency Ratio

9. Price consistency for a panchayat sample site is measured as an index of seasonal fluctuation in the producer price of the major crops. The seasonal fluctuation of prices for a specific crop is expressed as the ratio of the difference in the maximum and minimum producer price to the average producer price within the survey reference period. (The derivation of the average producer price is as described in paragraph 4 above). The crop-specific price consistency ratios are aggregated into a weighted price consistency ratio for each sample location. This aggregate price consistency ratio is computed on the basis of the price consistency ratio of the major crops only. The weights used to arrive at this average are the same as

TABLE B.2A

AFTER HARVEST PRODUCER PRICES AND AGGREGATE PRODUCER PRICE (CPI) BY SAMPLE PANCHAYATS: RAPTI

(Rs. per Pathi)

Sample Panchayats		Crops	After Harvest Producer Price						
			Paddy	Maize	Wheat	Oilseed	Pulse	Potatoe	CPI[a]
Dang	I	Ghorahi	7.8	9.2	12.7	24.4	9.8	9.0	10.42
		Tulsipur	6.0	8.0	8.7	17.2	10.6	9.3	8.32
	II	Manpur	7.0	7.6	5.25	13.0	10.7	4.2	7.30
		Sonpur	8.0	9.0	8.0	20.0	9.0	6.0	9.47
	III	Rajpur	10.0	10.0	6.0	23.0	6.0	4.8	10.28
		Hansipur	8.75	7.5	7.5	13.7	10.0	8.1	8.84
		Goltakuri	6.5	8.0	8.5	18.0	12.0	6.0	8.51
		Crops:	Paddy	Maize	Wheat	Millet	Barley	Potatoe	CPI
Salyan	I	Khalanga	7.0	5.0	7.0	6.0	7.0	7.0	6.30
	II	Phalabang	6.0	6.0	8.0	5.0	6.0	5.0	6.22
		Kajeri	8.0	5.0	10.0	5.0	5.0	8.0	7.05
	III	Badagaon	5.0	8.0	10.0	5.0	5.0	5.0	6.95
		Sivarath	6.0	5.0	12.0	4.0	6.0	6.0	6.65
		Ghajaripipal	5.0	6.0	7.0	5.0	7.0	6.0	5.88
Pyuthan	I	Bijuwar	7.0	10.0	7.0	10.0	6.0	8.0	8.67
	II	Khalanga	7.5	10.0	8.0	10.0	6.0	8.0	8.76
		Tiram	8.0	10.0	11.0	10.0	8.0	9.0	9.55
	III	Baraula	7.0	10.0	12.0	10.0	8.0	8.0	9.46
		Lung	8.0	9.0	12.0	10.0	9.0	9.0	9.33
		Syaulibang	9.0	10.0	10.0	10.0	7.0	10.0	9.78
Rolpa	II	Liwang	8.0	8.0	10.0	8.0	8.0	10.0	8.74
		Khungri	8.0	10.0	10.0	8.0	8.0	10.0	9.45
	III	Harjang	8.0	8.0	10.0	8.0	7.0	7.0	8.11
		Mirul	8.0	10.0	10.0	8.0	8.0	9.0	9.46
		Irriwang	10.0	12.0	12.0	8.0	7.0	2.0	9.48
		Dubidada	8.0	8.0	11.0	8.0	7.0	8.0	8.48
Rukum	II	Khalanga	8.0	8.0	8.0	5.0	7.0	6.64	7.64
		Chaurjhari	6.0	6.0	8.0	5.0	7.0	10.0	7.0
	III	Magma	6.0	7.0	6.0	5.0	5.0	5.0	6.25
		Athbiskot	6.0	5.0	8.0	5.0	6.0	5.0	5.89
		Syalpakha	8.0	6.0	8.0	5.0	7.0	5.0	6.65
		Garayala	8.0	5.0	7.0	4.0	5.0	8.0	6.26

a/ as in Table B.2 B.

The price for pulse represent current prices because after-harvest price were not recorded.

TABLE B.2B

AFTER HARVEST PRODUCER PRICES AND AGGREGATE PRODUCER PRICE (CPI) BY SAMPLE PANCHAYATS: RCU

(Rs.per Pathi)

Sample Panchayats	Crops	After Harvest Producer Prices						
		Paddy	Maize	Wheat	Millet	Barley	Potatoe	CPI[a]
Gorkha	Gorakhkali	5.0	8.0	9.0	8.0	6.0	9.0	7.34
I	Taranagar	8.0	9.0	12.0	7.0	6.0	5.0	7.95
II	Deurali	6.0	8.0	8.0	5.0	7.0	9.0	7.36
	Taklung	7.0	8.0	11.0	8.0	6.0	18.0	9.77
	Bunkot	8.0	6.0	10.0	6.0	6.0	8.0	6.67
	Ampipal	6.0	8.0	12.0	10.0	5.0	9.0	7.89
III	Barpak	5.0	5.0	10.0	5.0	6.0	5.0	5.36
	Swanra	5.0	7.0	12.0	6.0	6.0	9.0	7.00
	Jaubari	6.0	8.0	12.0	6.0	6.5	10.0	7.83
Myagdi I	Ghatan	9.0	10.0	10.0	10.0	14.0	9.0	10.70
	Piple	9.0	11.0	10.0	12.0	15.0	10.0	10.54
II	Begkhola	12.0	10.0	18.0	10.0	15.0	16.0	11.74
	Dana	12.0	16.0	18.0	12.0	15.0	16.0	14.94
	Sikha	12.0	16.0	18.0	12.0	15.0	16.0	14.94
III	Kuinemangale	11.0	20.0	20.0	12.0	16.0	12.0	16.24
	Narchyang	11.0	12.0	15.0	12.0	15.0	12.0	12.03
	Phakhapani	10.0	12.0	12.0	12.0	16.0	10.0	11.44
	Crops:		Maize	Wheat	Phaper	Barley	Potatoe	CPI
Mustang I	Jomsom	-	15.0	19.0	18.0	19	11.0	16.06
	Marpha	-	15.0	21.0	22.0	18.0	12.0	16.90
II	Kunjo	-	15.0	18.0	23.0	19.0	12.0	16.62
	Lete	-	14.5	20.0	23.0	18.0	11.0	16.45
III	Jhong	-	15.0	17.0	20.0	18.0	11.0	15.64
	Muktinath	-	15.0	16.0	18.0	15.0	12.0	14.79
	Kagbeni	-	15.0	21.0	22.0	17.0	11.5	16.55

"-" Signifies that a particular crop is not important in the district; and hence it has not been included in the weighted average computation of CPI.

a/ The CPI for each sample site represents the weighted average by crops of the crop-specific after-harvest producer price for each location.

in the CPI index except for the fact that they are scaled upwards to account for the fewer crops used in the price consistency weighting scheme. The information about seasonal fluctuation in producer prices collected in the village questionnaire was deemed to be less reliable with regard to the secondary crops. The aggregation is done over a fewer major crops. The selected crops and their area weights are as follows:

TABLE B 3

CROP SPECIFIC WEIGHTS USED TO MEASURE AGGREGATE PRICE CONSISTENCY

(in percentage)

Districts	Paddy	Maize	Wheat	Millet	Oilseed
Dang	49	29	9	-	13
Salyan	27	33	23	17	-
Pyuthan	28	47	17	8	-
Rolpa	14	60	26	-	-
Rukum	19	52	29	-	-
Gorkha	36	43	11	10	-
Myagdi	31	53	8	8	-
Crops:	Barley	Maize	Wheat	Phaper	Uwa
Mustang	28	28	12	14	18

10. As in the case of the aggregate producer price (CPI), the weighted average price consistancy ratio for each sample site is averaged over the number of sample sites in a specified market access strata. This is done on the basis of a simple average and the results are as indicated in Table 6.4 in Chapter VI.

APPENDIX C

NFC FOOD GRAIN DISTRIBUTION IN THE STUDY AREA

1. The amount of subsidized food grain distributed by the pulic sector Nepal Food Corporation in the seven hill and mountain districts of the study area is indicated in Table C.1. These distribution figures indicate the quota (of rice and wheat) allocated to the districts in 1981/82, and the most recent quota of 1983/84. Actual disbursements within a district during the specified year will vary from the quota because transport lines are very long and difficult. Secondly, even after food grains reach a particular district, not all of it is immediately sold. Actual sales figures diverge greatly from the alloted quotas, as indicated in Table C.1.

2. The total quota allocated to the Rapti districts and to Mustang, Myagdi and Gorkha was 2700 m. tons in 1981/82 and this has increased to 2875 m. tons in 1983/84. The 1983/84 quota for these seven districts represents 6.7% of the total national targeted food distribution by the NFC.1/ The quotas allocated to the districts of concern are less than the recognized deficit of rice and wheat for all districts except Mustang. The quota allotments also do not have any systematic relation to the deficits of paddy and wheat. The stated deficit on rice and wheat in Rukum is 3854 mt. and the quota assigned is 200 mt. Pyuthan has a 500 mt. quota though its recognized deficit is less than in Rukum.

3. The stock of food grains available for distribution in a district (col. 4 and col. 8) represents the actual volume of

1/ All figures are taken fron NFC, Annual Progress Report 1981/82 and 1983/84 (mimeograph)

NFC grains received in the district, including previous unsold stocks, during each fiscal year. It is more appropriate to measure sales as a proportion of this available stock. During 1981/82, NFC sales in the Rapti Hill districts amounted to 81% of the stock available for distribution, but this represented only 5.6% of the total production of rice and wheat in the zone. The percentage is even smaller - only about 2% in terms of the total production of all food crops in these districts. The corresponding proportions in the RCU area are slightly higher - 11.6% of wheat and rice production and 3.92% of all food production. Looking at each district, the volume of NFC grain sales is no higher than 6% of total food production in any instance.

4. The relation of the size of NFC distribution to total production is not a precise measure of its possible price depressing effects. One has to relate NFC distribution to the seasonal volume of marketed surplus within the district and the relevant supply and price elasticities. Empirical estimates of marketable surplus functions are not available for Nepal. Additional problems occur because rural markets within districts are severely fragmented while NFC distribution is not made uniformly within a district. The combination of both of these factors may lead to a situation where NFC distribution amounts to a substantial (and hence price determining) portion of the local marketable surplus. This issue needs to be studied more carefully with detailed analysis of the production and consumption patterns of selected locations. District level inference may prove to be misleading

5. The NFC seems to have minimal impact on farm gate price and actual producers even in its role as the purchaser of food grains in the food surplus <u>terai</u> districts. Procurement is basically done from mill owners and through a levy imposed on exports. The organization and problems (including poor management and shortage of working capital) of the NFC has been reviewed in some detail in two APROSC studies (1982 b, and 1982 c). In these studies also there is no verification of what, if any, direct effect the NFC purchases have on farm-gate and primary market prices.

TABLE - C.1.

NFC QUOTAS AND DISBURSEMENTS

Quantities in M/tons

District	1981/82						1983/84		
	1	2	3	4	5	6	7	8	9
	District Production of Rice & Wheat	Surplus (+) Deficit (-) for All Food Crops	NFC Quota (rice) and Wheat	Stock for Distribution	Actual Sales (% of stock)	Col 5 as % of total Food Production	NFC Quota	Stock for Distribution	Actual Sales (% of Stocks)
Salyan	9530	-2285	200	146	131(89.7)	0.55	250	329	152(46.2)
Pyuthan	7433	-3459	500	702	558(79.5)	2.92	450	663	447(67.4)
Rolpa	2179	-3241	450	486	396(81.5)	5.1	525	860	318(37.0)
Rukum	2230	-3854	200	147	114(77.5)	1.48	250	326	146(45.6)
Total Rapti Hills	21380	-12839	1350	1481	1199(81.0)	5.6	1475	2172	1063(48.9)
Gorkha	6505	-1386	500	342	224(65.5)	1.31	500	571	342(59.8)
Myagdi	3043	-2029	550	673	611(90.8)	5.73	550	553	370(66.9)
Mustang	446	-125	300	346	329(95.0)	12.1	350	540	349(64.6)
Total	9994	-3540	1350	1361	1164(85.5)	11.6	1400	1664	1061(63.8)

Source: Crop Production Estimates, 1983/84 (mimeograph) Progress Report 1981/82, and 1983/84 (mimeograph)

Col. 1 and 2 taken from FAMSD, Food Balance Sheet for 1981/82 (mimeograph)

Co,. 3 - 5 and 7- 9 from NFC, Progress Report 1981/82 and 1983/84 (mimeograph) respectively.

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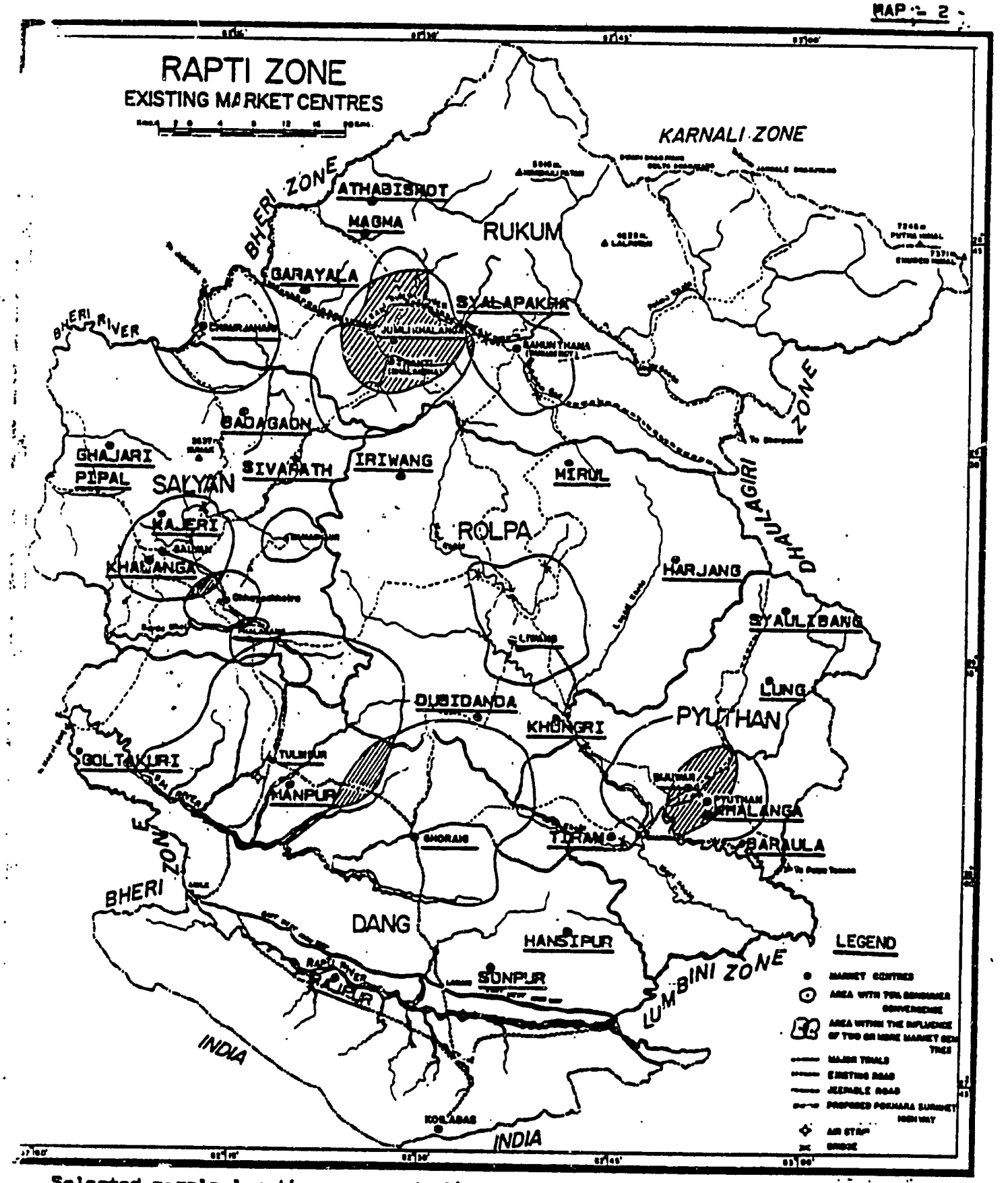
MAP – 1

STUDY AREAS
KALIGANDAKI CATCHMENT (1)
DARAUNDI CATCHMENT (2)
RAPTI ZONE IRD PROJECT (3)
NEPAL
(ADMINISTRATIVE)
FAR WESTERN
MID WESTERN
WESTERN
CENTRAL
EASTERN
C H I N A
I N D I A
BOUNDARY
HEADQUARTERS
ROAD

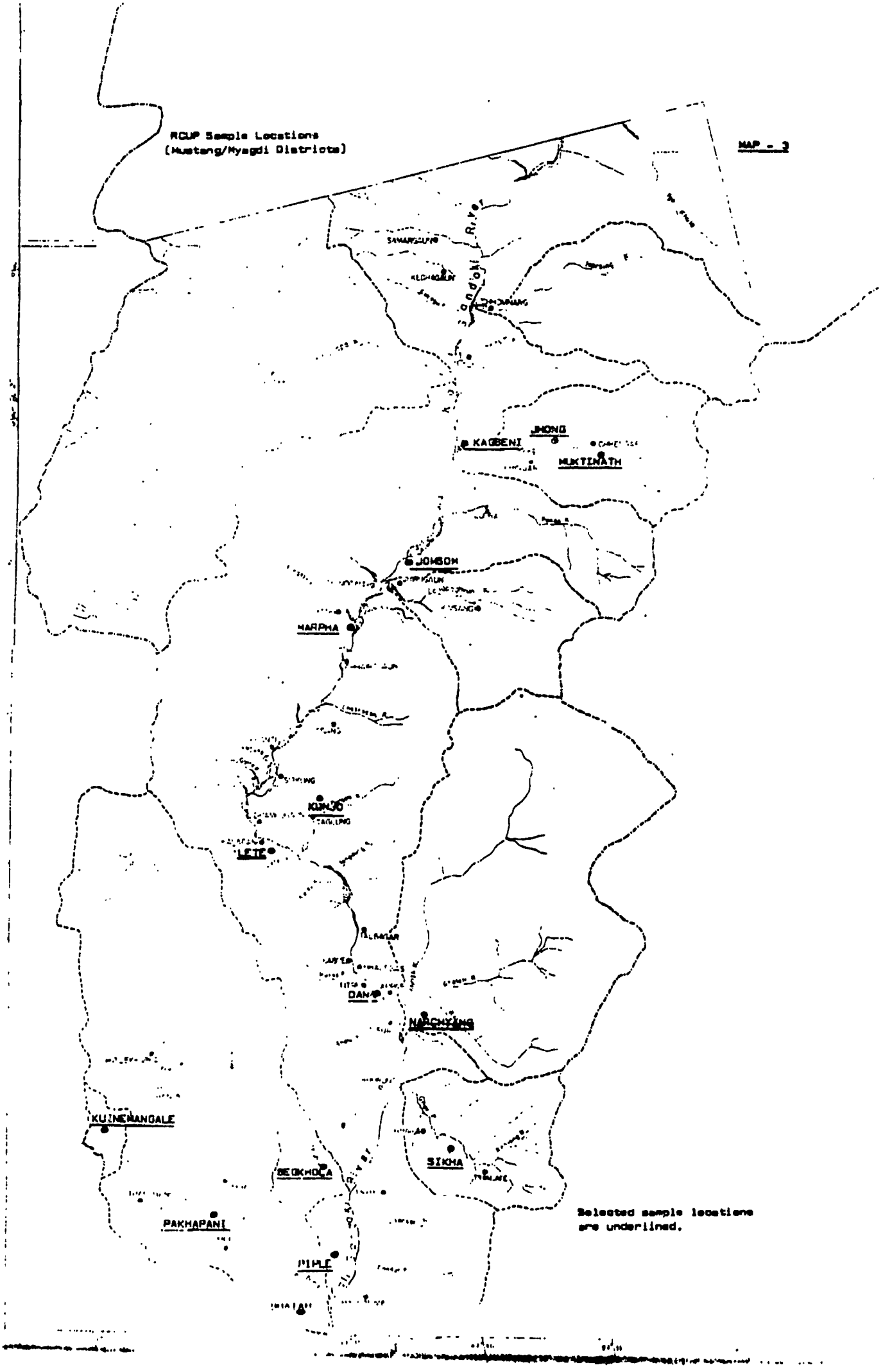
250

MAP - 2

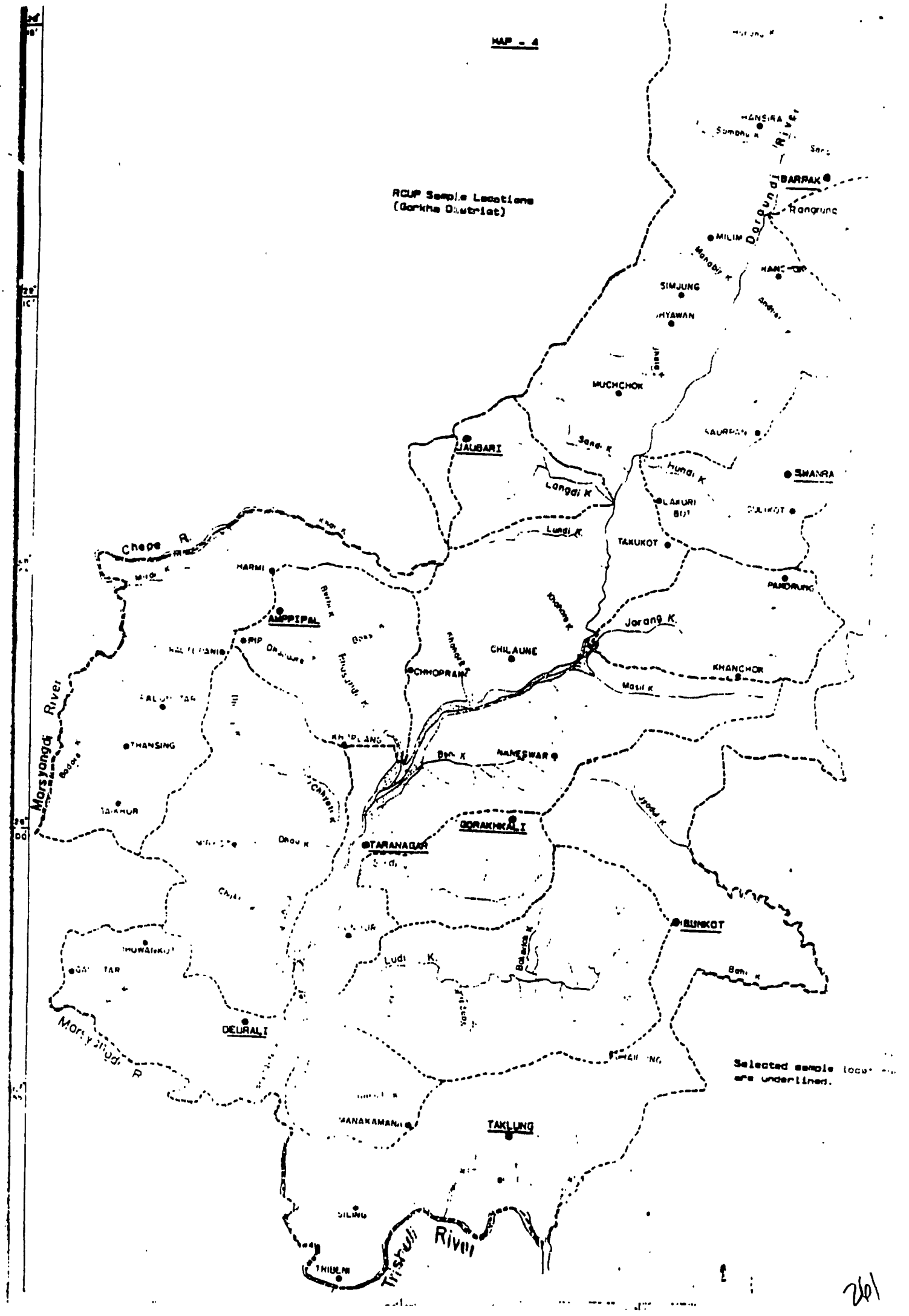


Selected sample locations are underlined.

The original map showing existing market centers in Rapti Zone is taken from APROSC, Feasibility Study of IRDP, Vol. 3, 1980.


RCUP Sample Locations
(Mustang/Myagdi Districts)
MAP - 3
KAGBENI
JHONG
MUKTINATH
JOMSOM
MARPHA
KUNJO
LETE
DANA
MARCHYANG
KUINEMANGALE
SIKHA
BEOKHOLA
PAKHAPANI
PIPLE
Selected sample locations
are underlined.

MAP - 4


RCUP Sample Locations
(Gorkha District)
Daraundi River
BARRAK
Rangrung
MILIM
SIMJUNG
MUCHCHOK
JAUBARI
SWANRA
Langdi K
Lungi K
TAKUKOT
Chepe R.
HARMI
AMPPIPAL
CHILAUNE
Jorang K.
KHANCHOK
Masli K
THANSING
Marsyangdi River
GORAKHKALI
TARANAGAR
BUNKOT
Ludi K.
DEURALI
Marsyandi R
TAKLUNG
Trishuli River
Selected sample locations are underlined.