



PRICING FOR MICROINSURANCE

A TECHNICAL GUIDE

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List of acronyms

MFI – microfinance institution

SACCO - savings and credit cooperatives

TPA - third-party administrator

WTP - willingness to pay

OE - open-ended formats

CE - closed-end formats

BG - bidding game

DC - dichotomous choice

TIOLI - take it or leave it

PC - payment card

FGD – focus group discussion

WHO – World Health Organization

UNDP - United Nations Development Program

NGO – non-governmental organization

MIS – management information system

LOE – level of effort

1. About the technical guide

1.1. Objectives

Microinsurance providers expressed a need for increased understanding and expertise in pricing their products. This need was confirmed by a survey conducted in selected countries and with selected microinsurance providers by the ILO Microinsurance Innovations Facility (the Facility) in 2012. Although often outsourced to external actuaries, it is important for microinsurance providers to play an active role in the pricing process as well.

The primary objective of the technical guide is to provide the reader with greater understanding of the pricing process and tools used to improve pricing. In this context, better pricing means:

- More accurate estimation of expected claims costs (incidence and average claims cost), even with little or no existing claims data;
- Better collection of experience data, and better monitoring and evaluation systems to review and adjust pricing; and
- More suitable pricing for the low income market.

It is expected that the technical guide will help the reader to:

- Identify key context elements to be considered in pricing microinsurance;
- Describe the pricing process and premium components;
- Set and validate pricing assumptions based on relevant data;
- Understand the calculations required for determining risk premiums, security and expense loadings as well as the final gross premiums; and
- Set appropriate monitoring processes for more effective pricing reviews.

1.2. Intended audience

Readers are expected to include:

- Microinsurance practitioners, especially persons responsible for setting premium rates in their microinsurance institution. Throughout the guide, this person will be referred to as the pricing specialist. Pricing specialist may be certified or trained actuaries, statisticians or mathematicians. They are the key persons involved in pricing microinsurance for their company.
- If pricing is outsourced, persons responsible for providing data and information to be used for pricing. These persons should also be able to analyse the external consultants' work and approve the premium rates for the company.

The guide may also be a useful reference to capacity building consultants working on improving the pricing capacity of a microinsurance provider. It could also be of interest to members of a product development team seeking a greater understanding of the pricing process.

1.3. Provisos

The intended reader is assumed to already have a basic knowledge of pricing techniques. Furthermore, while it is necessary to present some mathematical theory to justify certain calculations, it is not intended to be a comprehensive course on the mathematics of pricing nor an actuarial pricing course.

Emphasis is on microinsurance throughout with occasional references to mainstream insurance for illustrative purposes. Since it is relatively brief, the focus is on the general pricing elements of common types of microinsurance products without delving too deeply into pricing specific products. Because long term microinsurance products are not common, the majority of the discussion centers on short-term products.

Both theory and examples are used to illustrate the pricing process. Two case studies are presented in the appendices in order to reinforce the learning with concrete examples.

The Facility has developed a three day training course based on the guide. For more information about the course please contact the Facility at microinsuranceccb@ilo.org.

2. Introduction to pricing in Microinsurance

2.1. What is Microinsurance?¹

Analogous to the terms microfinance and microcredit, microinsurance refers to insurance products specifically targeting low income markets. In developing countries, the majority of the population lacks insurance, mainly because they are engaged in economic activity outside of the formal sector which is the traditional target of mainstream insurers. Microinsurance is however still a type of insurance since it is a mechanism of risk pooling by its purchasers who seek protection from various types of risks.

In its paper titled “Issues in regulation and supervision of microinsurance” released in June 2007,² the International Association of Insurance Supervisors (IAIS) defines microinsurance as follows: “Microinsurance is insurance that is accessed by low-income population, provided by a variety of different entities, but run in accordance with generally accepted insurance practices (which should include the Insurance Core Principles). Importantly this means that selection and management of the risk insured under a microinsurance policy is based on insurance principles and funded by premiums. The microinsurance activity itself should therefore fall within the purview of the relevant domestic insurance regulator/supervisor or any other competent body under the national laws of any jurisdiction.”

Clearly, this definition of microinsurance excludes government social welfare as this is funded by the country’s tax system or through other means such as publically owned natural resources. Government managed programmes such as universal health and pension systems are also not included since generally these are not funded by premiums commensurate to risk nor are the funds managed solely on the basis of insurance and risk principles. It does not include emergency assistance provided by governments in natural disasters, floods/fires in low-income townships, etc. However, as risk manager of last resort, the State may determine that there is a need to sponsor access to microinsurance for the most underprivileged through redistributive practices. There are cases where the State plays a stronger role in fully funding programmes, but these would only be considered microinsurance if they are run according to insurance principles.

While microinsurance is governed by the same insurance principles as traditional insurance (see Box 2.1) the low income market (LIM) has very different product and servicing needs. Therefore there is a need to rethink design, delivery, and management of this emerging industry to make it accessible to intended markets.

The definition of microinsurance is still under debate, and in a growing number of countries the regulator has come up with specific microinsurance regulations. Box 2.1 highlights some of the definitions that were considered in different countries. To define microinsurance, the quantitative attributes of products such as maximum coverage, type of cover, and level of premium are used and commonly have specified upper limits. To ensure that products will service the intended markets some requirements must be met such as simple policy wording, limited exclusions and so on.³

Box 2.1: Fundamental principles of insurance⁴

Insurance products are designed according to certain basic principles that apply to the concept of **economic loss**. In order for a risk event resulting in economic loss to be considered insurable, it must have the following basic

¹ For more information on microinsurance see the Microinsurance Innovation Facility’s reading list at <http://www.ilo.org/public/english/employment/mifacility/download/readlist.pdf>

² http://www.iaisweb.org/_temp/Issues_Paper_in_regulation_and_supervision_of_microinsurance_June_2007.pdf

³ Adapted from Cenfri presentation

⁴ Adapted from Wipf and Garand, 2011: An Introduction to Microinsurance.

Box 2.1: Fundamental principles of insurance ⁴

characteristics:

1. **The event must be random (i.e. occur purely by chance).** In the case of a microinsurance programme, this implies that the covered event must not be influenced in any way by the insured household. This usually requires some controls to prevent this from happening.
2. **The loss must be definite in terms of timing and amount-** This implies that the benefits and the conditions under which a claim for benefits can be made must be very clearly defined and understood at the onset, for the benefit of both the insured household and the insurer.
3. **The loss must be significant.** It would be uneconomical, for example, to insure petty losses that do not cause hardships for the household since this would be too costly to administer.
4. **The rate of loss must be predictable-** it should be possible to estimate the loss rate for each covered risk before launching the product, so that an equitable premium rate can be set with reasonable confidence. As discussed in the guide, this is why a programme should gather operations data as soon as possible. In the beginning, the rates of loss have to be estimated from national statistics or from experience of other programmes (which may have different characteristics).
5. **The loss must not be catastrophic to the insurer.** This has two dimensions a) a single loss of an insured should not devastate the programme; this implies that the benefits should be limited and that the size of the programme needs to include a “large” number of participating households; and b) Catastrophic events (i.e. a single co-variant event) must be either excluded or “reinsured”.
6. **A “large” number of persons (or assets) with similar risk characteristics must participate.** Essentially this means that the insurance programme needs to enrol a sufficiently “large” number of households for each particular risk event, and there is a reasonably similar probability of the risk event affecting each household. This requirement is grounded in mathematical statistics and is necessary for stable financial results of an insurance programme. The small premiums of the many insured households finance the losses (claims) of the few that are affected.
7. **Premium rates must be affordable** otherwise it is not an accessible financial service. For this to be possible, the probability of the risk event occurring must be very small, the amount of insurance coverage must be limited, and insurance delivery has to be efficient.

An important supplementary principle is the addition of loss prevention measures to microinsurance product design and delivery which are meant to lessen the chance and degree of loss before it happens.

Box 2.2: Examples of Microinsurance definitions

In India, microinsurance is defined based on coverage amount and term of policy, for both general and life microinsurance products. The maximum coverage amount is 50,000 rupees (INR) for term life and INR 30,000 for any other products.

In Peru, a preliminary regulation defined microinsurance on the basis of coverage amount. The revised version states that “microinsurance is an insurance product that protects the low income population against losses due to either life event or asset losses.” Some microinsurance requirements are listed, such as the necessity for the product to cover the need of the target population and the necessity to provide simple documentation.

In the Philippines life microinsurance is defined as a product targeting low income markets with cover not to exceed 500 times the daily minimum wage for Metro Manila. Providers must adhere to a set of service standards such as a maximum time limit for paying claims.

2.2. The objective of insurance pricing

As with conventional insurance, the main objective in pricing microinsurance products is to derive rates that will sufficiently cover all costs and generate a “fair” return for all partners involved. In the absence of permanent subsidies, even not-for-profit programmes must produce a surplus to finance future growth and to build up contingency reserves for unexpected claims fluctuations not covered by reinsurance.

In general, as discussed in detail in later sections, premium rates should be set so that the actuarial present value of all premium collected over the duration of coverage will be sufficient to fund the expected present value of future claims and expenses incurred on the same block of business and still generate a “modest” surplus. In theory, the projected interest income should also be part of the present value calculation. Since the effect of interest increases with product duration due to mathematics of compounding, it is not as significant for pricing short term products, especially those without a savings component.

As most microinsurance contracts sold in the market so far are one-year term (or even shorter), the period during which premium and claims transactions will occur is short. As such, the time value of money is often ignored to simplify calculations and to provide a small additional margin to compensate for pricing uncertainties. A second reason investment income may be ignored is that the reserves for short term products (i.e. portion of premium set put aside to pay claims and expenses) is not suitable for high yield investment since it has to remain fairly liquid. Given the current low interest environment, these two factors minimize the importance of interest rate considerations in pricing many microinsurance products.

As interest income is usually minimal, setting the premium rates correctly is paramount because it is usually not possible to revise them until renewal nor is it very prudent from a marketing perspective to increase rates shortly after launching a new product. Even if the insurer realizes the premium is insufficient after a few weeks, insurance regulations in most countries prevent rate increases for existing insurance in force. Premium rates can only be revised once an insurance policy term ends and it is up for renewal. This poses a serious risk (not only in microinsurance) for longer duration products and is one of the main reasons why short term insurance durations are still predominant in microinsurance. The nascent interest in micro-pensions, for example, is so far mostly focused on the asset accumulation aspect and not on multi-year pay-out annuities.

Box 2.3: Consequences of gross pricing errors

It is important to understand the possible consequences of errors in the pricing of a microinsurance product. These errors affect not only the financial results of the provider, but also the emerging microinsurance market.

If the premium is set too high:

- Low take-up will likely result because the market perceives the product as unaffordable and constituting poor value for low-income households with limited financial means. If take-up is low and does not increase over time, the required scale is not achieved and sustainability cannot be attained.
- Anti-selection often increases because an over-priced product will only attract clients who continue to see value in it, i.e. those more likely to claim. Lower risk insurance buyers will gravitate towards better value products if these are available or they may not buy insurance at all.

If the premium is set too low:

- Premiums collected will not be sufficient to cover claims and other expenses, leading to poor financial outcome for the provider.
- Large price increases may be required in the short term to correct inadequate pricing and maintain solvency. As a result, many of the current customers will not renew their coverage, resulting in wasted

Box 2.3: Consequences of gross pricing errors

investments already made in marketing and sales. Furthermore, the market will likely lose confidence in the microinsurance provider. This happened to Karuna Trust in India which provided a highly subsidized health insurance product in order to achieve wide market participation quickly. However once the subsidy was removed, the renewal rate abruptly dropped to 10 per cent. The impact of large price increases would likely be similar in most other contexts.

- Insolvency (in addition to unsuitable product design and/or poor operational implementation) may lead to the discontinuation of the product. As a result, the target population may turn away from insurance as a financial risk management tool and regaining their trust may take as long as a generation.

Adapted from Churchill et al, 2012, chapter 21

For new products, a good strategy is to calculate the rate as accurately as possible and then build in a modest margin (10-20 percent) to make sure that there is only a slim chance of future rate increases. If the calculated rate turns out to be near correct, this strategy will permit faster surplus build-up. Furthermore, it will allow for a benefit increase after ample surplus build-up which will be very positively received by the market.

After realizing that premium rates are insufficient, some programmes introduce restrictive measures such as sub-limits or waiting periods to reduce claims costs rather than raise rates. These may be applied to all business in force in some cases (such as some mutual) or only to new sales. While this not desirable it may be more palatable than raising rates in certain situations.

As stressed in Box 2.3, setting rates correctly is essential. Inadequate rates could threaten the solvency of smaller programmes especially if they are still new and with few resources. On the other hand, an overpriced product will normally lead to lower sales volumes than projected, especially when the purchase decision is voluntary, and when the premium is of a magnitude that seriously competes with other spending decisions of low income earners. Lower sales in turn may cause expense overruns – that is, the actual expenses incurred by the insurer and other participating parties in developing, distributing and administering microinsurance exceed the corresponding premium components projected to cover these expenses.

2.3. The product development process

Pricing is part of the broader process of product development and product review. It generally follows market research but is usually integrated with product development and business planning, especially if modelling is used to prepare financial projections. Once the preliminary price has been established based on available information, product features and price are adjusted until the desired financial projections are achieved. This is a very effective approach since the programme's financial results can be projected and price adjustments made until targeted surplus reaches desired levels.

Figure 1. The product development process⁵

⁵ Adapted and revised from McCord, M. 2011, Microinsurance product development for microfinance providers



2.4. Why is pricing microinsurance different?

As mentioned, microinsurance is not insurance business as usual. All along the value chain of microinsurance, innovation is required to overcome the constraint of dealing with a relatively unknown and inaccessible market. Buying behaviour needs to be mapped and understood to overcome lack of understanding of insurance among the low income population.

Listed below are some of the main differences between insurance and microinsurance. All of these will impact the tasks of the pricing specialist.

2.4.1. Client focus

Even more so than in other markets, client perspective must be at the centre of microinsurance activities to ensure acceptance of insurance as a risk-management tool. To build demand, products have to be designed to match client needs in term of risks to be covered, affordability and timing of premium, simple claims procedures, minimal underwriting, and processes designed to enhance accessibility to clients.

Management decisions should always consider foremost the impact of decisions on microinsurance clients⁶. This is an important rule that guides product design, premium level, and monitoring and evaluation. Furthermore, insurers must be continuously aware to minimize the possibility of reputation risk in serving the low-income market since it is difficult to restore credibility if the market loses trust or suspects any form of exploitation.

2.4.2. Scarce data

While there is a rapidly growing interest, in most countries there are only a few microinsurance providers or none at all. This limits available industry experience data for pricing. In some countries, even mainstream insurance data is not available due to lack of insurance market development which further limits the potential of using comparable products to serve as a pricing benchmark.

Aside from limited data in such countries, microinsurance providers are rarely able to count on guidance from reinsurers who until recently lacked interest in supporting development and reinsuring microinsurance markets. The pricing specialist has to be both creative and cautious in developing rates in

⁶ Simanowitz, Anton and Therese Sandmark, 2010, Social Performance Indicators for Microinsurance

these situations. After products are rolled out, databases should be built up immediately and performance of new business monitored vis-à-vis the initial rates.

For the few programmes that may have claims experience, the size of the portfolio is often too limited for solid conclusions. Furthermore, programmes often face the difficulty of collecting quality data due to lack of management information systems. Many programmes still collect data on a manual basis, or use systems that have not been appropriately designed to collect microinsurance data.

National data may be available however often it is incomplete or unreliable. Moreover, national census data can be biased, or weather data and property registers may be incomplete.

A good starting point in most countries is population mortality rates available from World Health Organization (WHO). As well, experience from neighbouring countries can sometimes be utilized and adapted.

In general, when the quality of data is limited, it is better to utilize simple pricing calculations rather than build complex mathematical models with artificial parameters. Such models are not a substitute for quality data.

2.4.3. Need for an affordable premium

Reaching the low-income market means designing accessible products since financial accessibility is a key to unlocking demand. With high budget constraints and low purchasing power, insurance is not the first consumable need for low-income households therefore it stands to reason that microinsurance premiums need to be low, especially in a context of no subsidies (the usual case).

On the other hand, development and delivery costs may be higher per unit of insurance than for traditional business. Much of the market is rural and remote with no access to bank accounts which impacts the cost of setting up an effective distribution network. Efficiency is one of the key requirements to solve this challenge.

Traditionally, actuaries have a tendency to be very conservative in a context of limited access to data. While if it is important to set a fair price for the providers, premium level and client value have to be very attractive for low-income markets. Actuaries need to overcome their tendency to overload premiums.

2.4.4. Limited access to dedicated pricing software

The use of common pricing tools (such as MoSes and Prophet) is very rare in microinsurance. Pricing specialists will have to develop their own pricing models mainly using tools such as Microsoft Excel and Access. This is preferred by many anyway who view the pricing tools in the market as “black boxes”.

2.4.5. Importance of processes

It is also important to bear in mind that processes are part of the microinsurance package. The way insurance is marketed and distributed, the way that premiums are collected and so on, has significant impact on premium adequacy.

In microinsurance, even more than in conventional insurance business, processes will significantly impact pricing and penetration rate. The pricing specialist has to carefully consider the impact of process design to ensure an attractive offer.

2.4.6. Innovative distribution model

Unlike traditional insurance, which relies on brokers and agents for sales, the whole distribution process is often re-engineered for microinsurance. To contain costs, microinsurance providers must delegate the functions of the insurance value chain to the party that can deliver it at the lowest cost. Partnering with institutions which already have a footprint in the target market, especially if they already carry out financial transactions, is often considered a good way to reduce transaction costs. Some examples of potential delivery channels are microfinance institutions (MFIs), retailers, affinity groups and utility companies. This approach is commonly referred to as partner-agent delivery.

Delegating the distribution of insurance to a trusted entity can help gain the confidence of the population and thus enhance demand.

The partner agent model nevertheless poses some important challenges such as how to motivate front line staff, how to establish and maintain effective partnerships, and the preference of some distributors to rely on their existing sales force to sell insurance to their target market.

Whatever the business model for distribution, it will impact on the different parameters to be developed in the pricing and modelling exercises. A detailed understanding of its functioning will then be needed to develop appropriate assumptions

Table 2.4: Examples of innovative distribution channels

Distribution method	Country	Insurance company	Product	Distribution method	Performance
MFI	Mexico	AMUCS (Asociación Mexicana de Uniones de Credito del Sector Social)	Voluntary life insurance	Network of micro banks that serve rural areas in Mexico	35,000 policies sold
Retailer	Brazil	Mapfre	Vida protegida y premiada Life, employment and PA insurance + non insurance services such as pharmacy discount and lottery ticket	Casas Bahia: Low cost, credit-based appliance and furniture retailer. Product sold by Casas Bahia staff during the appliance sale process. Role of distributor: <ul style="list-style-type: none"> • Sales • Customer care • Support for back office function • Claim settlement 	Significant take up
Local retailers	Kenya	UAP	Kilimo Salama, launched in 2009 Insures maize inputs in case of drought or excessrainfall	Local retailers, sell seeds with or without insurance cover. Registration made through the vendor phone. Claim payouts paid directly through mobile phone.	21 000 policies (June 2011)

Distribution method	Country	Insurance company	Product	Distribution method	Performance
Community based	India	Uplift	In-patient health	Insurance benefits are sold to Uplift MFI's members, and claim payments are discussed and decided from a claim settlement team, elected by the members	100 000 members
Mobile delivery	Ghana	Hollard	Tigo Family Care, launched in 2011 Life insurance policy. Cover determined by airtime usage	Sold through Tigo agents or originated using own mobile. Administration, claim and servicing done through mobile.	2 million lives covered

2.4.7. Mainly short term products

The majority of the products available in the microinsurance space have policy terms of 12 months or less. Some are only active for 24 hours. The main reasons for this are the difficulty of selling long term product to this market. For the insurer, short duration products are less risky and allow it to re-price quickly as experience develops.

Box 2.5: On the difficulty of selling long term policies

A well-established insurance company in Burkina Faso, UAB Vie, delivers a savings product called Cauri d'or, which mirrors methods used by traditional tontiniers (susu collectors). Tontiniers offer informal contractual, daily savings programmes that people know very well. Cauri d'Or covers 15,000 informal sector entrepreneurs, such as women and men selling goods at market stalls in urban areas. Clients' contributions are collected every day (as low as 0.3 USD per day) at their work place. Terms vary from 1 month to 5 years. Short term contracts (1-11 months) do not benefit from interest rate and commissions of 5% to 2.5% are charged to cover administration costs. Contracts of 12 months and more benefit from a 3.5% interest rate.

Despite more attractive benefits for long term contracts, clients favour the short term contracts, with 99% of clients choosing contracts of less than a year.

Kenya Orient Limited, a Kenyan insurer, has developed the Safari Bima product, a personal accident coverage that can be sold for a 24 hour, 1 week or 1 month duration. The product is sold by agents selling scratch cards or bought directly by the client by sending an SMS to the company. Policies for just 24 hour coverage account for 75% of the policies sold. This highlights the preference of the target market for short term policies.

2.4.8. Limited demand, long term approach for sustainability

More than 10 years of microinsurance development shows how slowly volume and sustainability are achieved in this sector. With a limited knowledge and culture of insurance, take up rates are often lower than expected. Trust is fundamental to breaking in to this market, and evidence of insurers paying claims is vital.

Unlike traditional lines of business, short term profitability is not a common standard for microinsurance, except for credit life products. Engaging in microinsurance requires a long term approach in terms of sustainability and return on investment. Institutions beginning microinsurance programmes need to carefully evaluate their motivation. Microinsurance relies on the low-margin-high-volume paradigm, which aims to sell insurance on a much greater scale than for conventional insurance (in terms of insured

units rather than premium amount). Although to date few have achieved the desired volumes, ill-priced products may cause considerable financial damage when they do achieve scale. Up-front investment can be smoothed through internal subsidies (through a corporate social responsibility budget, for example) or external subsidies (mainly donors active in the microinsurance space).

2.5. The role of the pricing specialist in microinsurance

Pricing specialists in microinsurance are often required to play roles that go beyond applying actuarial techniques. Some specifics of the role are listed below:

- **Understand the product design and its impact on microinsurance take up:** Regardless of the organizational structure of the insurance provider, the pricing specialist must at least understand the rationale behind the product design, even if s/he is not part of the product design team. Measures that promote simplicity, inclusivity and cost control, such as limited exclusions, extended age limits, community pricing, co-payments, and so on must be reflected in the assumptions since they will affect the take-up scenarios.
- **Promote understanding of insurance principles:** Where the target markets have limited understanding of insurance, there is need for great transparency and simplicity in all the work done by the pricing specialist. There are often cultural and language barriers between the person doing the pricing and the target market as well as the rest of the microinsurance team, partners and stakeholders (who often have limited experience in data reporting and quality issues), which will need to be overcome. This is of particular importance where the sales force is concerned.

Members of the sales force must have an in-depth understanding of insurance, and pricing specialists should be involved in training them and promote measures which help stakeholders to better communicate the insurance principle of risk pooling. For that, clear reports need to be produced. Moreover, the pricing specialist should meet with front-line staff in the field and assist with training them to explain, for example, why premium is not reimbursable to insurance customers if they do not claim. The pricing specialist thus has the opportunity to be an ambassador and promote a better understanding of insurance.

- **Manage collection and monitoring of data:** Very often, the pricing specialist may be responsible for designing, implementing and ensuring a quality data collection mechanism. In addition, s/he will likely be responsible for analysing the data. Understanding the context is essential to providing appropriate interpretations and recommendations of corrective actions to programme management.
- **Contribute to the microinsurance strategy, based on sound assumption rather than over-optimistic hope:** Building realistic financial projections is necessary to support the design of an insurance provider's microinsurance strategy. The properly built financial projection helps determine the initial investment needed to achieve the targeted volume and the medium/long-term vision to adopt before expecting a return on investment.
- **Work on a diverse range of products:** The scarcity of pricing specialists does not allow the same degree of specialization as in conventional insurance, where life pricing specialists may not be skilled to price health or property insurance – in microinsurance, the same person may be required to price quite different types of microinsurance cover. Moreover, these are often bundled into a single package.

Of course, pricing specialists are also expected to:

- Set or build and continuously review a risk model which matches the target population risk profile and calculate accurate risk pricing. This activity may imply segmenting the target population into groups facing different risk patterns.
- Define financial projections which are the backbone of any insurance business plan. The pricing specialist should help management by setting different projected scenarios.
- Set the claim control mechanism to mitigate anti-selection, fraud and moral hazard, and continuously assess the evidence to detect any deviation of the experience vis-à-vis the pricing assumptions.
- Continuously monitor and extract relevant information from experience, to ensure timely risk mitigation strategies and proper understanding of the portfolio.

Some actuaries or other pricing/statistician specialists may be involved in asset management and investment activities. The impact of microinsurance on those types of activities will not be addressed in this guidebook.

3. Basic concepts of pricing

Key messages:

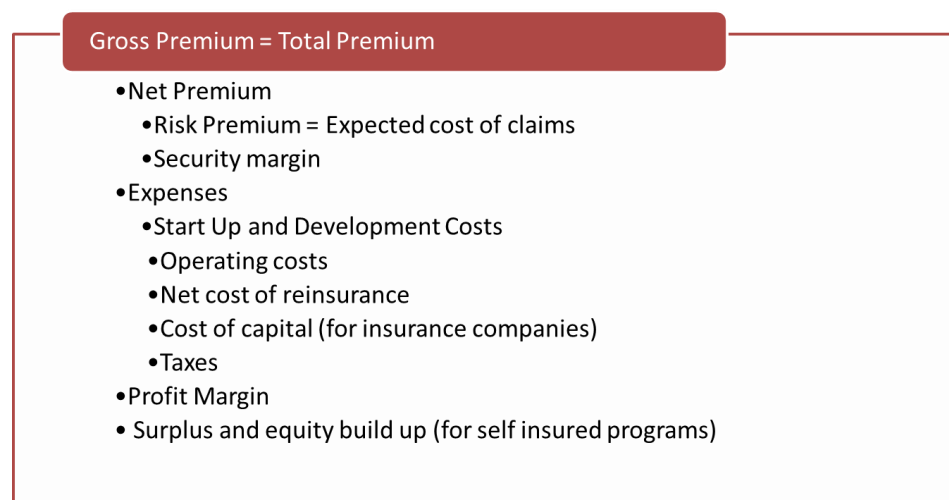
Pricing is a cyclical process, including a short term cycle to define a first level of premium, and a longer cycle of pricing review through continuous monitoring.

Different products may have different specifics, but the same process applies to all products.

Both product features and processes will impact pricing in microinsurance.

3.1 Main components of the premium

The objectives of pricing have been discussed in section 2. The overall objective is to derive a premium, (commonly referred to as the *gross premium*) that will be charged periodically to the microinsurance customer. The components of the gross premium are shown in Figure 2. Derivation of all these elements is covered in the guide.



Here, the term *net premium*⁷ is defined as the risk premium + added margins. *Risk premium* is the portion of the total premium which is expected to cover expected future claims expenses for the period over which it is calculated (month, year, etc.). Usually, this includes a *security loading* meant to increase the probability of having sufficient net premium for the period. Statistically, the risk premium is the *present value of expected claims*⁸ for the period, thus for each particular period the *actual claims* will be higher or lower. The purpose of the security loading is to increase the chances of having sufficient net premium to cover claims in most of the future periods (chances depend on the degree of loading).⁹

⁷ Note that the term net premium can have different definitions in different contexts. Where insurers cede to a reinsurer, the term net “net premium” often refers to gross premium collected by the primary insurer less the ceded reinsurance premium.

⁸ That is, it may be viewed as the statistical expectation of the random variable “present value of claims for the period”.

⁹ Statistically, it may be viewed as placing the difference between net premium income and incurred claims in a particular period within a confidence interval above zero.

A second margin may also be added to compensate for the uncertainty of the assumptions made in the risk premium calculation. Such margins may be added separately for each assumption or loaded in total to the final premium, which is the better option. Net premium calculation is discussed in more detail in chapters four to seven.

The expense components of the gross premium should cover all the expenses incurred by the insurer and other partners involved in the distribution and claim processes with the exception of costs which may be subsidized by external donors¹⁰ or through cross subsidies by other products. The words “cost” and “expenses” are synonyms here, meaning an outgo in a profit and loss account.

A profit margin (however minimal) should be included in the gross premium. Its level will depend on the mission of the microinsurance programme and type of institution (“for profit”, “not for profit”, etc.) and the need to build capital and internal development strategies.

Some mutual and self-insured programmes are required to build up surplus and equity to increase their solvency. In the absence of shareholders to provide that capital, surplus and equity are usually built up by way of increased pricing margins, membership fees, and investment income.

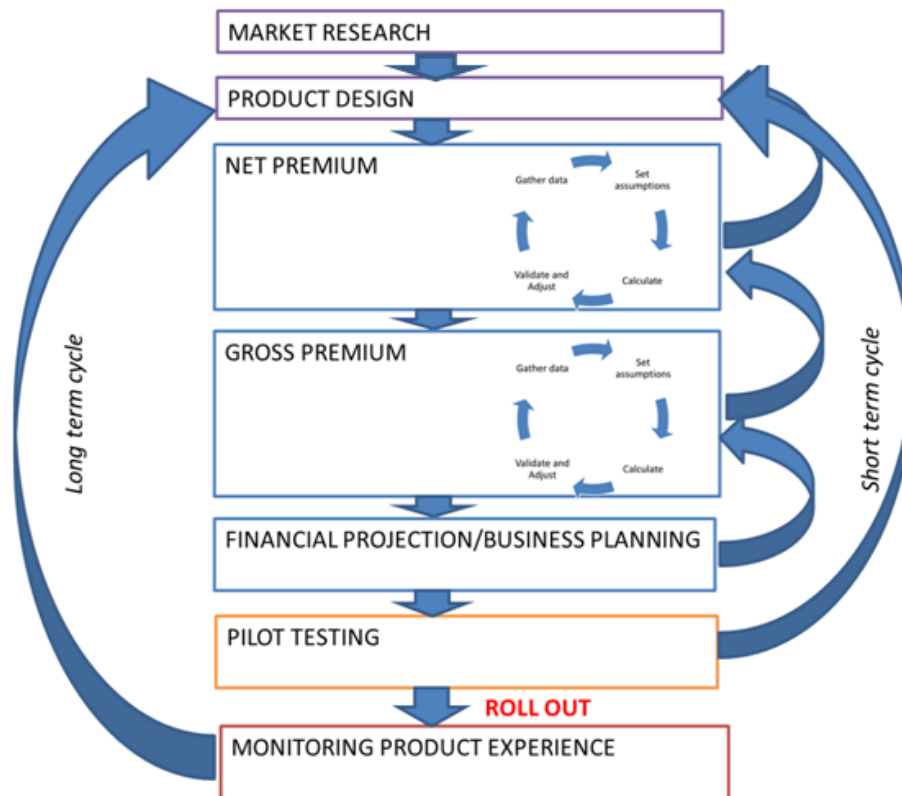
Derivation of gross premium from net premium is discussed in chapters eight to ten.

3.2. Introduction to the pricing cycle

Pricing is a continuous cycle. It includes both a long-term cycle, in which monitoring is essential for future pricing review, and a short term cycle, in which various iterations between product design and final price are usually necessary. The following graph illustrates the cyclical aspect of pricing.

¹⁰ Whether microinsurance should be subsidized or not is commonly debated but is not discussed in this guide.

I



STEP 1: Product design

As mentioned in chapter 2, pricing is part of a broader process of product development. Pricing can only start when an *initial* product has been designed by the product development team, based on market research. The price may be revised until financial projections are suitable (step 4).

STEP 2: Calculate the initial premium

As experience data for microinsurance is limited, the sub-processes of collecting data and setting assumptions for the main determinants of the risk premium are crucial.

STEP 3: Calculate the gross premium

Determine the expense loadings in order to calculate the initial gross premium.

STEP 4: Business planning and financial projections

This is an important validation step. Business planning is normally an extensive workshop exercise involving the future programme managers and the personnel involved in product development. Aside from setting growth and desired profitability targets, expenses are projected in detail for each period in the future.

The business planning information is loaded into an appropriate tool that produces future income statements, balance sheets, performance indicators, cash flow projections, and so on. In this exercise, the

adequacy of various assumptions and margins will become more obvious, thus the product as well as net and gross rates should be finely adjusted until the desired financial results are achieved.

Of course, the overall premium rate, product features, and financial value are still subject to the constraints of developing an excellent, high value, relevant and affordable product that the market expects. Steps 1-4 are thus iterative and integrated until a suitable product has been developed for piloting.

STEP 5. Pilot testing

Piloting a product is necessary because only then can some flaws be detected. Sometimes, incorrect conclusions are drawn from market research and at times piloting may reveal such a problem. Furthermore, it is prudent to test and fine-tune the delivery processes. It is not uncommon for another repetition of steps 1 to 4 again to make necessary revisions to product, price, and projections if the pilot reveals important information.

Box 3.1: Research conclusions can be misleading¹¹

In 2008, an MFI-sponsored mutual insurance program in Vietnam surveyed its members to assess demand for types of microinsurance products and willingness-to-pay. From the results, demand for insurance protection and retirement savings was deemed to be very high. The research team concluded that, aside from the weekly insurance premiums of 1000 VND (USD 0.06), members were willing to save at least 8000 VND (USD 0.50) per week for retirement. An insurance product was designed which was bundled with 5000 VND (USD 0.30) weekly retirement savings. When the product was piloted it was met with stiff resistance to the weekly retirement savings in spite of a well-executed socialization strategy. The product was subsequently modified and the savings element dropped. This was followed by a very successful full launch that took account of the results of the pilot project.

STEP 6: Monitoring product experience

Monitoring and validation is particularly relevant for microinsurance. Once a product has been fully rolled out, it's important to continuously monitor the experience and gather information to validate and/or adjust the estimated pricing assumptions over time. HOWEVER, as discussed in section 2, one should be very cognizant from the beginning that raising rates after rollout is very difficult and should be avoided as far as possible.

Monitoring includes calculation of performance indicators which should be tracked and compared to those projected in step 4. Developing trends should be analysed by management.

The cycle now returns to the beginning. In time, as experience data is collected, the product design may be revisited, and the pricing and may also be reviewed and revised.

This technical guide will focus in detail on steps 2, 3 and 6. Step 5 will only be discussed in general terms where relevant.¹² Likewise, step 1 will also not be covered although there is some interesting literature available on the subject for further study.^{13,14}

¹¹ Wipf and Garand, 2011: Business Planning for Microinsurance

¹² For more on microinsurance business planning, the reader may wish to read *Business Planning for Microinsurance*, Wipf and Garand, 2011.

¹³ Cohen, Monique; Sebstad, Jennefer; McGuinness, Elizabeth. 2006. Guidelines for market research on the demand for microinsurance (Microfinance Opportunities and Abt Associates Inc.).

¹⁴ McCord, M. 2011. Microinsurance product development for microfinance providers (Appleton USA, MicroInsurance Centre).

Premium calculation involves gathering data, setting assumptions, performing calculations, and validation. The guide focusses on net premium calculation first before discussing data and setting assumptions so that the reader understands how data and assumptions are used when reading those sections.

3.3. Product specifics

Though this guide is not intended to cover pricing for specific products in detail, this section discusses the main product classifications which may impact the pricing process.

3.3.1. Life insurance

According to various landscape studies¹⁵, life microinsurance products are the most widely sold in the microinsurance market. In commercial insurance the three main categories of life insurance are term life, whole life, and endowment insurance.

Term insurance provides coverage for a fixed period. Typically for microinsurance, the term is either one year, term to a specified age, or, when linked to a loan agreement (as most credit life is), it is co-terminus with the loan maturity.

Whole life insurance provides coverage over a person's lifetime without an increase in the premium rate once the coverage is issued. This is not common in microinsurance.

Endowment insurance is normally sold with a fixed term (varying from just a few months to as long as 40 years) and a guarantee that a specified benefit will be paid, either upon the insured's death, if the coverage is still effective, or on the maturity date, if the insured survives. The life cover on an endowment plan may stay level throughout the term or it may increase over the term to reduce risk to the insurer and to make premium rates more affordable. In microinsurance this function is often replicated with a "cash back" (return of premium) feature since this is easier to explain to the prospective buyer.

Until recently,¹⁶ endowment-type products were rare in microinsurance because they require long term guarantees that insurers may be reluctant to make and the need for long premium payment discipline which low income households find particularly difficult. Some insurers sell participating endowment plans where the policyholder participates in the long term investment and other risks by agreeing to an annual dividend which is calculated annually and based on the profitability of the plan; this is less risky than a fixed long term guarantee.

Life products are frequently bundled with other types of cover, such as health and asset protection. In microinsurance, accident and permanent disability riders are often attached to life products.

The most widely sold term life product in the microinsurance market is credit life. The main purpose of this product is to ensure that an outstanding loan is paid off if the borrower dies. There are numerous variations with respect to benefits, modes of premium payment, household members covered, and so on. The following table summarizes most of the variations

¹⁵ See for example Roth et al. 2007. The Landscape of Microinsurance in the World's 100 Poorest Countries (The MicroInsurance Centre LLC); Matul et al. 2009. The landscape of Microinsurance in Africa (International Labour Organization)

¹⁶ Endowment plans are becoming more common. One can find microinsurance versions in Indonesia, India, Nepal, Bangladesh, and Kenya, for example.

Table 3.2: Summary features of credit life microinsurance

Feature	Approaches
Types of coverage	<ol style="list-style-type: none"> 1) <u>Decreasing coverage</u>: Benefit equals scheduled loan balance at time of death 2) <u>Level coverage</u>: Level coverage means that coverage amount does not change. Most commonly it is equal to the original loan amount but it can also be a higher multiple (e.g. 2 or 3). Sometimes, though, it is also lower; for example, when only the non-collateralized portion of a loan is insured. 3) <u>Combination of level and decreasing</u>: For example, benefit may equal scheduled outstanding loan balance plus a multiple of the original loan amount 4) <u>Other variations</u>: Any of the above, but also with lump sum funeral benefits if the insured dies. Some products pay only a funeral benefit if a family member dies, others also repay all or a portion of the loan
Premium payment mode	<ol style="list-style-type: none"> 1) Single premium (SP) which is either deducted from the loan proceeds or collected as cash from the applicant when loan is issued or amortized with the loan 2) Premium is added onto the loan interest rate and collected with the rest of the loan payments; this can be explicit or implicit, and in the latter case the insurance appears to be “free” to the borrower
Who pays the premium?	In most cases the borrower pays the premium. Sometimes, however, the lending institution pays for it and in other cases the lender simply manages an internal reserve funded from profits or fees to clients. Ultimately, though, the cost of coverage is passed to the borrower in one form or another.
Who is covered?	The life of the borrower is always covered, but sometimes coverage extends to the rest of the household. Of course, the lending institution is always protected.

Funeral insurance is also common and is generally sold as a term life product, where the sum insured should cover the costs associated with burying the deceased insured. Benefits can be in kind or cash.

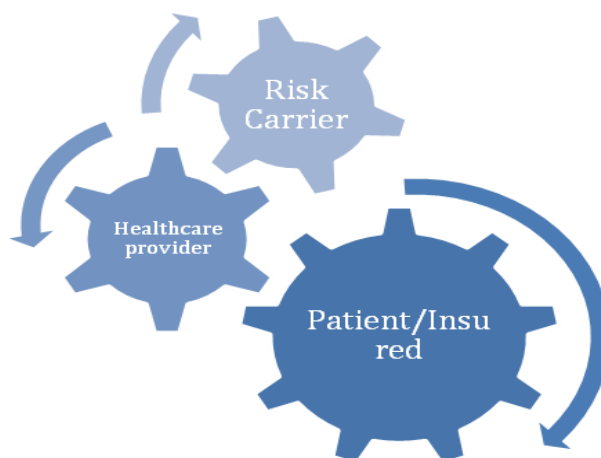
3.3.2. Health insurance

Health insurance is the most sought-after microinsurance product in most countries. It is also one of the more difficult to price and manage. There are three main types of traditional health insurance:

- **Income protection insurance** provides coverage in case of sickness or disability leading to the inability of the insured to continue his/her occupation in the short or long term. In traditional insurance, this is generally a long term policy (up to the retirement age). In microinsurance hospital cash products are short term policies covering loss of income while hospitalized.
- **Critical illness insurance** provides a lump sum payment in case of terminal or highly debilitating illness, to support the client to adapt to the disability or to pay for cost of treatment.
- **Private medical insurance** covers the full or partial cost of care, depending on the policy terms and conditions. Benefit coverage may be subject to a waiting period or ceiling. This is the most common version offered to the microinsurance market. Coverage varies widely, ranging from basic assistance in case of hospitalization as a result of an accident to comprehensive out-patient and in-patient coverage.

The complexity in pricing health insurance lies in estimating the true expected claim amount and client behaviour. This is so because the experience depends on the *management* of the health insurance programme. Utilization of health services must be controlled and managed through effective frontline gate-keeping and patient screening to ensure only truly necessary cases are referred to costly in-patient treatment. As well, appropriate treatment for each type of illness must be monitored since the health care

service providers tend to push consumption to increase their income. This implies developing specific processes to control claim experience.



3.3.3. General insurance

Also known as non-life insurance, general insurance products offer coverage against damage to property (motorbike, house, or livestock). The policies are usually short term.

The most common microinsurance product under this category is agricultural index insurance. Pricing index crop insurance requires a distinct set of skills, and will not be covered in this technical guide. A few property microinsurance products are also being developed. The main challenges in developing this category of microinsurance product are keeping claim control costs low and the co-variance of insured events.

Box 3.3: What is index insurance?

Index insurance is a type of insurance that does not indemnify the pure loss in case of occurrence of the insured event, but defines at the outset the payment that will be made upon an event being triggered, measured by an index. Index insurance is suitable for risks that are correlated to a parameter or an index of parameters, such as level of rain (measured through weather station or rain gauge), greenness of the grass (measured through satellites) or level of grassland availability. It is often used for crop insurance and there are some experiments as well in livestock insurance. Index insurance is an attractive way to provide insurance to small rural farmers as it reduces the cost of settling claims (as losses do not need to be assessed) and thus reduces transaction costs. It is transparent, with the indices clearly known to both the insured and the insurer before the event.

The problem with index insurance is basis risk. This refers to the fact that actual compensation is not matched to actual losses. Sometimes payments are made to those without losses while those with real losses do not receive any compensation.

3.3.4. Examples of microinsurance products

Some microinsurance products are documented in the Microinsurance Innovation Facility’s website. The reader could refer to the following projects for examples of different product types:¹⁷

Life	Health	General
Short term	VimoSewa - India	Property
Old Mutual- South Africa	ICICI Prudential - India	Hollard- South Africa
Protecta - Peru	UMSGF - Guinee	Index based crop insurance

¹⁷ From www.microinsurancefacility.com; guarantees”learning journeys summarize the main learnings of the Facility’s innovation grantees

Life	Health	General
Bradesco- Brazil	Care Foundation - India	IRI - Ethiopia
	MicroFund for Women - Jordan	Sanasa – Sri Lanka
	Naya Jeevan - Pakistan	
Long term		Livestock
UAB Vie – Burkina Faso		ITGI - India
Max Vijay - India		ILRI - Kenya

3.3.5. Impact of product type on pricing

By type of product

Table 3.4 highlights the key elements which affect pricing and generally differ between product categories.

Table 3.4: Pricing characteristics by product

	Life insurance	Health insurance	General insurance
Claim frequency	Risk event generally happens only once (low frequency)	<ul style="list-style-type: none"> • Depends on health status. • Multiple claims per beneficiary possible in one year (high frequency). • Claim frequency can vary over time (seasonality of risk, learning curve of the insurance buyer) 	Risk event can happen several times, but probably not in one year (low to medium frequency)
Expected claim amount	Defined in advance, often lump sum	<ul style="list-style-type: none"> • Cost can vary over time (for example medical inflation). • Can be defined as a monetary amount or reimbursement to service providers. • Benefits are often subject to limitation (ceiling, waiting period, exclusions) 	Fixed amount of money, replacement value, or indemnity. Benefits are often subject to limitations
Term	Short term, long term, or entire lifetime	Short term	Short term
Claim control	Easy for death: provide proof of death (death certificate), with cause of death. More difficult for disability and accident	<ul style="list-style-type: none"> • Fraud (from patient and doctors) is frequent. Controlling claims is a key area of health insurance. • Health care providers should follow clear protocols. • Patients need to be clearly identified • Product coverage should include claim control features (waiting period, max claim amount etc.), and a screening / gate-keeping mechanism 	For index insurance claim control is very easy. Much more difficult if all claims need to be assessed and cost of each claim estimated

	Life insurance	Health insurance	General insurance
External factors impacting pricing	Mainly demographics and general health status of the population	Demographics, environment, quality and access to health care services, social security coverage, geography	Case by case
Risk exposure¹⁸	one year to life	One year	To be defined, can take different parameters into account

By product term

Long term products (more than one year) are mainly life products (endowment and whole life). In many countries, the insurance regulation requires a special insurance license to provide long term products due to a different risk structure and specialized management skills that are necessary.

The main characteristics of long term products which impact pricing are:

- Difficulty of changing or revising premiums after policy issue
- Importance of investment income
- Importance of inflation assumptions
- Lower cost of claim processes, as claim will happen only once in several years
- Customer understanding and satisfaction may be low for low income market
- Important differences in reserving and using surplus
- Long term increases in mortality for life insurance, decreased mortality for life annuities.

Even though some long term products are emerging in the microinsurance field, the guide will focus on short term products as these are the most common. Limited guidance will be provided for long term product pricing, but pricing long term products is difficult and requires support from an actuary.

Even though all products require a specific calculation, the pricing process described in this guide will apply for all lines of products.

3.3.6. Impact of product design on pricing

The product design, including both product features and processes, will greatly impact the gross premium. The following should be considered at the product design stage to allow the pricing specialist to calculate a premium for the insurance product:

- **What events/risks will be insured?** This should include a clear definition of the event and conditions of cover (for example, how to define disability, which hospitals are accredited for patient confinement, and so on).
- **What will the insurance provide in case the insured event happens?** Will there be modifying factors to the insurance payment, such as deductibles, co-payments, or benefit limits?

¹⁸ The risk exposure is a measure of the volume of risk. It corresponds to the total insurance units which have been exposed to the risk in the period used for calculation. An example of how to calculate risk exposure is given in section 6.1.1.

- **Will the insurance provide additional ancillary “value added” benefits?** For example, ambulance transportation, telephone helplines, counselling etc. may need to be accounted for in the pricing.
- **Will there be waiting periods?** Are they either a period from the start of the policy (during which the insurance will not pay for insured events), or a period of waiting after a claim event before the insurance programme will pay? For example, in the case of total and permanent disability, the insurer will wait for 3, 6, or 12 months to establish the permanent nature of the disability.
- **What exclusions are likely to impact the premium?** (for example pre-existing medical conditions, age limits, damage resulting from floods or declared livestock epidemics).
- **What are the claims control processes in place?** Is the programme management carefully piloting the microinsurance activities?
- **Who or what exactly will be insured?** Examples could include:-: persons belonging to a well-defined group (defined how?); a single individual or a group of family members (“family” being defined how?); vaccinated cattle; motorcycles bought with a loan from a certain finance provider; dwellings in a certain area etc.)
- **What are the eligibility criteria for being allowed to buy insurance?** Will it be voluntary for people who have belonged to the group for a minimum period of time? Or will it be mandatory for all group members? Or will insurance only be offered to the members of a group if a minimum percentage of them buy it? Or, can anyone buy it? What are the criteria for being part of the group?
- **Will there be any individual selection of risk?** (such as medical questionnaires, veterinary examinations, assessment of the flood-risk of a dwelling and so on)
- **Will insurance be available to buy throughout the year, or only on one or more defined dates?** (Reflecting, for example, the cash cycle of the target population)
- **What will be the duration of insurance cover?** Will different durations be offered?
- **How will renewal be handled?** (Automatic? On request? Tied to another event such as taking a loan? Etc.)
- **What premium payment options will be offered?** (Yearly, in advance or more frequent payment modes?)
- **Will premium differentiate by risk factor?** E.g. different premium for different age groups, geographic locations, building material of dwellings, type of livestock.
- **Will premium (for some or all insured) be subsidized?** If yes by whom and how?
- **What regulatory requirements have to be observed?** E.g. limits on premium or sum insured in order to qualify as “microinsurance” and allow distribution through non-traditional channels. Is there statutory prescription of mortality tables?

The adequacy of the price depends to a large extent on the processes involved in selling, administering and servicing the product. When established insurance companies introduce a new product, they can usually use the processes already developed and tested for other products: the same sales force, the same administration operations and IT support and the same claims department.

In microinsurance all related processes tend to be substantially different, and are often new and untested. Very often new products will be distributed by new distribution partners with their own strengths, weaknesses and ways of doing things. New claims assessment and different customer service protocol skills will be needed. All these aspects have implications for sales volumes, renewals and persistency, distribution and administration costs, and claims. Unless all these aspects are kept in mind during the product design and pricing process – and their likely impact anticipated – even the most scientific pricing exercise may result in unexpected and possibly disappointing outcomes.

4. Setting the Net Premium

Key messages

There are several methods for pricing. As microinsurance is often a starting business, the main method is exposure pricing, where assumptions have to be made for claim frequency and expected claim amount. These are usually the two most relevant parameters, and skilfully making appropriate assumptions for them and using them correctly is at the core of the pricing specialist's expertise.

Using a model for pricing is a powerful tool to simulate future scenarios and clarify relations between different pricing parameters. Models are simultaneously used to prepare financial projections and often pricing is adjusted until projected financial outcomes are as desired by programme stakeholders.

4.1 The pricing methods

There are three main methods to arrive at the risk premium:

- Experience pricing extrapolates past claims experience, assuming that with adaptation it provides a good enough estimation of future claims;
- Exposure pricing is done in the absence of suitable past claims experience and is based on assumptions of the key determinants, primarily expected claim frequency (how many claims will be made from 100 insurance units) and expected claim amount (average claim amount of those that claim);
- Credibility pricing combines both of these methods in cases where experience data is sparse or in cases where there is limited confidence in the data.

4.1.1 Experience pricing

This approach, historically also called “burning cost pricing”, assumes that past claims experience reveals the intrinsic “riskiness” of the insured population and can thus be used to help predict the likely total amount of future claims.

Experience pricing is the preferred approach when:

- An insurance scheme has been in force for some time, and when there are sufficient claims to make estimates (past experience has to be significant to act as an indicator for future experience. For life insurance, for example, where claims are less frequent, larger group sizes (or more years of observations) are needed than for health insurance.);
- No key features of the product or the insured population are expected to change.

In many cases though, if the expected changes are known, the experience data can still be adapted and used.

When using experience pricing, one should pay attention to the following aspects:

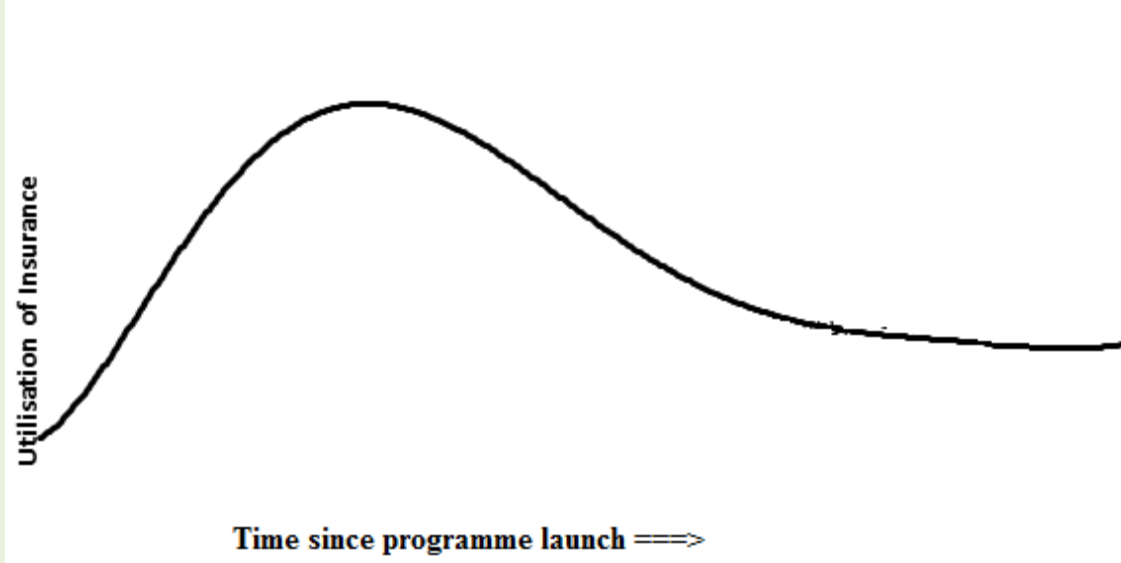
- If the same (closed) group of persons is insured over the years, they will get older, and if age is a risk factor, insurance utilization will change (usually increase) over the years;
- The amounts payable on claim may be subject to other forces such as inflation;
- A careful distinction between systematic and extraordinary claims should be made (such as catastrophic events or specific client behaviour patterns due to new entry in a scheme). Those

claims may not be predictive of future insurance utilization and need to receive special consideration (i.e. be reasonably reduced) to avoid distorting the averages.

Box 4.1: Experience Pricing	
•	Assumes the past experience provides a “good enough” estimation for future claims
•	Requires sufficient claims data to make reliable estimates
•	Requires assumptions for possible trends to extrapolate appropriately
•	Assumes no major changes to product or insured population

Box 4.2: Example: Implementing trends in Experience Pricing (artificial example)						
PAST HEALTH INSURANCE CLAIMS EXPERIENCE						
YEAR	persons insured at year end	average number of persons insured	total claims amount			
2011	30'000	27'500	8'350'000			
2010	25'000	23'500	6'800'000			
2009	22'000	18'500	4'850'000			
2008	15'000	12'500	2'950'000			
2007	10'000	7'500	1'500'000			
2006	5'000					
INFLATION ADJUSTED WITH 12% PER YEAR BETWEEN 2007 AND 2012						
YEAR	2007	2008	2009	2010	2011	2012
2011					8'350'000	9'352'000
2010				6'800'000	7'616'000	8'529'920
2009			4'850'000	5'432'000	6'083'840	6'813'901
2008		2'950'000	3'304'000	3'700'480	4'144'538	4'641'882
2007	1'500'000	1'680'000	1'881'600	2'107'392	2'360'279	2'643'513
SUM	1'500'000	4'630'000	10'035'600	18'039'872	28'554'657	31'981'215
divided by average numbers insured	200	231.50	260.66	290.97	319.05	357.33
<p>The second table shows the impact of inflation on insurance claims: the 4.8 million paid in 2009 would be 6 million in 2011 and 6.8 million in 2012. In other words, if the same claims occur in 2012, they would cost 6.8 million instead of 4.8 million. Thus, adjusting past experience for inflation would suggest that the 357.33 average inflation adjusted claim per person expected for 2012 should be a good risk premium for 2012, all else being equal.</p> <p>An average medical inflation of 12% per year in this example cannot be derived from the past claims data, but needs to be procured from other sources (for example health care provider fee schedules), and should be relevant to the insurance in question.</p>						

Box 4.3: Example: Considering non-systematic claim experience



When a new health insurance programme is launched, the first set of participants will likely not have been insured before. If this is the case, it will have two important consequences. Firstly, participants are likely not familiar with insurance. Second, depending on how well it is explained, they will take some time to understand their entitlements (this may also be aggravated by logistical delays in delivering insurance cards, claims forms etc.). This will keep initial claims frequency below the expected long term average. Secondly, new participants are likely to have a number of health related ailments that have existed for some time such as hernias (i.e. there is pent up demand for health services) and will be inclined to seek treatment for them (a behaviour that product design and exclusions can reduce but never completely eliminate). Hence it is commonly observed that new health microinsurance programmes start with low claims ratios (total claims divided by total premiums), which after a while begins to rise steeply before converging to a long term equilibrium, as shown in the above graph. This and similar phenomena has to be considered when using past claims for experience pricing.

In many cases microinsurance programmes do not have several years of history, or if they do, they either do not have the necessary volume to allow past claims experience to be a good predictor of future claims experience, or they face data-quality issues, thereby reducing the usefulness of the experience data.

4.1.2 Exposure pricing

Until more microinsurance programmes gather more claims experience, the most common pricing approach in microinsurance will be by “exposure”. In exposure pricing, the missing experience data is replaced by analytical assumptions for the relevant constituents of the premium formula. The challenge in using exposure pricing is trying to adapt assumptions to the specific characteristics of the insured group. The method will be discussed in the following chapters.

Box 4.4: Exposure pricing

Box 4.4: Exposure pricing

- Is based on assumptions regarding claims frequency and claims severity for target clients derived from sources other than past claims
- Assumptions attempt to reflect “true” underlying claims distribution
- Used when no suitable past insurance claims experience is available
- Is therefore often the only method for pricing individual insurance

4.1.3 Credibility pricing – combining experience and exposure pricing

Credibility pricing involves combining exposure and experience data in a mathematical way. Credibility can be described as the amount of predictive power assigned to an estimate. The practitioner should decide how much predictive power to assign to the experience data that he or she has. This can be derived using actuarial and statistical techniques. As a simple example, it is generally assumed that the larger the number of claims over a given period, the more confident the practitioner would be in the experience data, and thus the greater the credibility that would be assigned to the data.

Whether or not using a complex actuarial or statistical technique is possible, the probability that can be assigned to the experience data needs to be determined. In classical credibility this number is often denoted Z , where Z is a number between zero (for zero credibility) and 1 (for full credibility). The credibility, Z , is applied to the observed experience, while $1-Z$ is applied to the related experience (e.g., the exposure data). The exposure estimate is called the *complement of credibility*.

Credibility-weighted estimate using Classical Credibility

$$\text{Credibility-weighted Estimate} = Z * (\text{Experience Estimate}) + (1 - Z) * (\text{Exposure Estimate})$$

where Z is the credibility factor, $0 \leq Z \leq 1$.

A good complement of credibility should be accurate and unbiased¹⁹. The data must be readily available (often, the ideal data is not available), and it is helpful if the complement is easy to compute. Finally, it is important that the complement of credibility has a logical relationship to the base statistic. This quality must be balanced with the desire to have a complement that is statistically independent from the base statistic.²⁰

As an example, Company ABC wishes to design a death benefit for sugarcane cutters. The company that employs all of these sugarcane cutters happens to have detailed mortality information about its employees. However, there have only been 50 employee deaths in the last three years. It is determined that this is not enough claims experience for full credibility, so the pricing specialist for ABC decides to use exposure data to complement the experience data. One available and reliable data source is the WHO mortality table for that country. As a complement of credibility, the WHO mortality table should make logical sense, as mortality rates should be similar across a country²¹. The data is available and easy to find. The WHO rates will be accurate and unbiased to the extent that countrywide mortality is similar to the mortality of sugarcane cutters. The WHO rates are not statistically independent assuming that the mortality of the sugarcane cutters is included in the countrywide mortality calculated by WHO. However,

¹⁹ The distinction between accurate and unbiased is important. An unbiased statistic varies randomly around the following year's losses over many successive years, but it may not be close. An accurate statistic may be consistently higher or lower than the following year's losses, but it is always close (Werner and Modlin, 2010. Basic Ratemaking)

²⁰ Boor 2004, “Complement of Credibility” pp. 7-8

²¹ If the country is relatively homogeneous and not too large!

the sugarcane cutters might be such a small percentage of the entire country's mortality that the two are practically independent. These factors need to be balanced against each other and compared across alternative sources of exposure data.

Using data from other countries or even other regions within a country as a complement of credibility could be misleading. Great care and caution should be used when deciding which related exposure data should be used in credibility pricing. Objective judgment should be used in deciding how accurate the experience data is, as well as how applicable the exposure data is. In many cases, the data used for the complement of credibility cannot be used directly, but instead must be adjusted using methods described in Chapter 6 before it can be credibility-weighted with the experience data. In a context with little internal experience data, thus low credibility, the choice of the exposure complement can be even more important than the experience data itself.

Including external exposure data via a credibility procedure still might not be enough to make the entire data set fully credible. This can be especially true in microinsurance, where there can be a lack of quality data. The pricing specialist needs to determine how best to use the available internal and external data in order to come up with the most accurate price, and continue to monitor the data as additional experience and exposure data become available.

Box 4.5: Credibility pricing

- Is a combination of experience pricing and exposure pricing
- Is generally applied for groups which have accumulated claims experience
- Assumes that past claims experience only partly reflects true drivers of underlying claims
- Assigns relative weights to each component (experience and exposure) in a mathematical way

4.1.4 Group insurance, community pricing and individual pricing

The question of whether premium will be differentiated by risk factor has an impact on the price calculation. By definition, risk factors are properties of insured units that make insurance claims more or less likely (or more severe), such as age and health status for life insurance and disability insurance, or microclimate, irrigation and soil quality for agricultural insurance. Differentiating premium by more risk factors (for example whether the person smokes) rewards better risks and punishes substandard risks (attracting more non-smokers and resulting in a better claims experience).

Classifying microinsurance participants and charging them different rates greatly increases both complexity and cost. For example, the smoking status of an individual has to be ascertained, and continued tests would cost a portion of the usual life microinsurance premium. Other risk factors have to be similarly ascertained at some cost (sex and age usually being the most straightforward). Secondly, differentiating by risk factors increases the complexity for the distribution channel which has to verify and record the risk factor status and then apply the correct premium rate. Thirdly, splitting the risk pool into too many sub-groups reduces the predictability of claim, as the larger the pool, the more predictable the event (see Box 4.6 on the Law of Large Numbers).

It is advisable in most cases to carefully consider whether or not to differentiate premium by risk factor in microinsurance. It is much simpler and more common to charge the identical premium rates to old and young, male or female. Moreover, risk premium is calculated on the basis of the class or “community” the insured unit belongs to, rather than on the basis of each individual insured.

Although community pricing is usually used in group insurance, the two are not synonymous. Group insurance is a method of providing insurance coverage to a group of insured units under one contract. It uses a different approach to packaging, pricing, administering, and underwriting insurance. The policyholder is usually the group itself, not the individual insured. It may or may not be (but usually is) classified differently in insurance regulations.

Group insurance is favoured in microinsurance because it:

- Has lower administration costs since the group can normally perform some of the administrative tasks at a lower cost than the insurer; for example, collecting and encoding enrolment data of group members;
- Normally offers coverage with minimal individual underwriting, especially if coverage is mandatory;
- May have lower distribution costs, if the group acts as an effective aggregator of a large enough number of risk units. However, aside from cooperatives and MFIs, there are not many natural groups in existence in the low income market, since, for example, fewer people are formally tied to an employer, or are members of a club or professional association;
- May have lower claims costs, if the group serves to reduce adverse selection. High take up is required to achieve this, and the group membership must be based on objective criteria other than the common desire to seek insurance coverage.

Not all group microinsurance programmes satisfy these requirements, and they can cause confusion. For example, an insurance company may offer a MFI a group life insurance contract on behalf of the MFI's client-members, but the MFI may offer their members the choice of whether or not to buy the insurance. In this case it may or not be group insurance but it depends on the allowable reasons of individuals to opt out. For example, if to opt out client-member must produce proof that they are insured elsewhere such as through a competing MFI, then it may still be regarded as group insurance. If opting out is possible without any condition then the programme's experience will be similar to that of individual insurance.

4.2 Net premium formula

Formula (1)

$$\text{Risk premium} = [\text{likelihood of insurance claim}] \text{ times } [\text{expected amount of insurance claim}]$$

The two important parameters are likelihood (expected claim frequency) and size of claims (expected claim amount). Whether or not the net premium accurately reflects the risk depends entirely on the quality of the assumptions used to derive them.

The risk premium estimates the claim amount by insurance unit. The insurance unit can be:

- Insured animal (if the premium is charged by cow, then what will the claim amount per cow be?)
- Family of villagers (if the premium is charged by family then what will the average cost of hospitalization (of any of its members) be, per family?)
- Acre of farmland
- Life of a microfinance borrower

The risk premium is calculated relative to the period for which the premium is paid, for example, annually.

Pricing methods are based on statistical theory and on the assumption that the underlying risks can be represented by probability distributions that describe how random variables (such as incidence, average claim amount, aggregate claims, etc.) are distributed (i.e. the probability of each possible outcome of each

random variable). As it is impossible to know what each *true underlying distribution*²² is, the pricing specialist needs to match the data she has to reasonable *assumed underlying distributions*. In other words, the assumption is made that the sample data is a realization of the random variables which the proposed distributions describe. As such, each type of data is viewed as a ‘sample mean’, that is, a statistical estimate of the hypothesized probability distribution’s mean. It is useful to intuitively understand this when using data for pricing.

4.2.1 Likelihood of claims: the expected claim frequency

Also known as claim frequency or utilization rate, the expected claim frequency is the probability of claims happening in the insurance period for the insurance unit.

Calculating a single point estimate for the claim frequency relies on the statistical law of large numbers, which states that the average of the results obtained from a large number of trials will be close to the expected value, and gets ever closer as more trials are performed. The outcomes of past experiments or observations thereby allow predictions about the future.

Box 4.6: Examples of the law of large numbers

Tossing a coin: Although it is known that the likelihood of a thrown coin resulting in heads is half, it is not possible to predict with certainty the outcome of a single coin toss, nor be certain that the outcome of six tosses will result in three heads. The Law of Large Numbers does however predict that if the coin is tossed 1000 times then the number of heads is likely to be close to 500.

Contrary to occasional misconception, the law of large numbers does not say that insurance claims reduce with growing number of insurance units but that insurance claims become more predictable; even after a million tosses of the above coin, the probability to fall on the heads side will not reduce.

Mortality rate: Assume that through reliable demographic census data, it is known that 5 out of 1,000 persons from a given population die every year. Looking at a sample of just 10 people does not allow an accurate prediction of how many will die during the next 12 months. Increasing the sample (in this case the number of lives insured) to 10,000 makes the number of deaths in a year more predictable. There is still no certainty. The mathematics only gives answers to a certain confidence level, for example 95%; that is, in 95 out 100 cases there will be no less than 36 deaths and no more than 64. In a pool of 10,000 people, that is 50 plus or minus 28%. If the pool was 100,000 instead, in 95 out 100 cases there will be no less than 456 deaths and no more than 544, a deviation of just 9% from the average expected 500 deaths.

Thus, all else being equal, the relative difference between the predicted number of deaths and the actual number decreases with growing pool size: the event has become more predictable.

An important pre-requisite of the law of large numbers, however, is that the random events analysed are reasonably comparable (“homogeneous”). The likelihood of the outcome of coin tossing does not say anything about the likelihood of the outcome of rolling dice no matter how often one tossed the coin. Similarly, the observed past experience of cow mortality is unlikely to be useful to predict goat mortality, a stone house’s likelihood to be destroyed by fire is not a good predictor for a house build of wood, and the observed past experience of male mortality is seldom useful to predict female mortality.

By contrast, last year’s mortality experience of a given group with given age and sex distribution is a good estimate of next year’s number of deaths if the group is large enough and has not changed significantly. Additionally, adjusting for the fact that they all are one year older would be even more accurate.

²² More precisely, for continuous random variables, it is called a probability density.

Box 4.7: Calculating the likelihood of claims for short term products: the mortality table example

Age	male	female
	Mortality (q_x)	Mortality (q_y)
15	0.48	0.26
16	0.64	0.31
17	0.82	0.39
18	1	0.47
19	1.15	0.53
20	1.26	0.32
21	1.33	0.47
22	1.35	0.41
23	1.35	0.37
24	1.37	0.37
25	1.41	0.39
26	1.45	0.42
27	1.49	0.44
28	1.55	0.46
29	1.64	0.47
30	1.78	0.51
31	1.98	0.57
32	2.17	0.66
33	2.38	0.76
34	2.6	0.85
35	2.84	0.97

A sample mortality table at the left shows the likelihood of death for each age, usually shown as “per thousand lives exposed” during one year, and usually distinguishing between males and females. The numbers shown in the table are referred to as q_x where x denominates the age (so $q_{20} = 1.26$ for men); sometimes female mortality is called q_y to distinguish it. The quantity q_x represents the probability that a male with exact age x will die before his $(x+1)$ 'st birthday.

Part of a Slovakian mortality table from 1990

When calculating the risk premium for a life insurance scheme paying 50,000 if a man aged 30 dies during one year, an actuary using this table would divide q_{30} by 1,000 and multiply the result by 50,000 to arrive at a risk premium of 89.

Before using a mortality table, the pricing specialist should know:

- Which population it represents. For example, does it reflect population mortality or insured lives mortality? The latter usually group usually has a lower mortality rate.
- How up to date it is since in most countries, mortality has continually reduced over the last century.
- If the figures already include margins for error.
- If the figures reflect selection (that is, the fact that mortality of newly insured persons is usually lower than that of uninsured persons of the same age in conventional insurance because particularly unhealthy individuals are denied insurance). This is usually the case if the table has several columns that show the mortality at time intervals after the insurance is bought until the “ultimate” column, when the underwriting effect is assumed to have “worn off”.

Where a uniform premium rate is charged, the pricing specialist will need to make assumptions to define the insured population’s demographics and to calculate a weighted mortality rate. Such data is usually available or it may also be estimated from the market research preceding product design, provided respondents were chosen randomly. If the target population doesn’t vary much by age, an average age assumption may be assumed and the corresponding q_x taken as a good estimate of the mortality. A better method is to apply an age-gender weighted matrix (derived from the target population, as a random sample or of the entire population) against the mortality table to calculate a composite rate.

Even though the number of insurance claims is uncertain, with known likelihoods, the Law of Large Numbers allows one to use one number to estimate the number of claims resulting from a collection of insured units, or the likelihood of any one insurance unit making a claim. This is the expected claim frequency, usually the most important constituent of insurance pricing.

Long term risk premium calculation

For long term products, the risk premium is usually calculated by discounting the expected future value of all benefits under the policy. The present value (or discounted value) requires interest rate assumptions.

With an assumed interest rate of i , the present value of a certain payment of S in 5 years is $\frac{S}{(1+i)^5}$. That is, if invested at an annual interest rate i , this amount will have grown to exactly S in 5 years.

The amount represented by the formula is the *present value* of S .

With the same interest rate assumption, the *actuarial present value* – that is, the risk premium – of a payment that may or may not be made within the next 5 years is the sum of [present value of payment at end of year t * probability that payment is made at end of year t] where t is 1, 2, 3, 4, 5. For simplicity it is assumed that payment is made at year end, if the event that triggers payment happened during the year.

For example, the risk premium for an n -year term life insurance that pays an amount of S at the end of the year the insured person dies, if the insured person dies within the next n years, is calculated as

$$S * \sum_{k=0}^{n-1} v^{k+1} {}_kq_x = S * \sum_{k=0}^{n-1} v^{k+1} {}_kp_x q_{x+k}$$

To make such formulae more readable (for actuaries), actuaries use common abbreviations, such as $v=1/(1+i)$, or ${}_kq_x$ which is the probability that a person age x today will live another k years and then die within one year. ${}_kp_x$ is the probability that a person age x today will live another k years, and q_{x+k} is the probability that a person age $x+k$ will die within one year.

The above formula provides the risk premium that is statistically equivalent to the claims payments, and its calculation assumes it is paid in full the moment the insurance begins. This is sometimes the case, but for long term insurance the premium is often paid in annual or periodic (half yearly, quarterly or monthly) instalments. Simply dividing the result of above calculation by n would ignore the fact that premium is no longer paid when the insured person dies, so mortality has to be taken into account also when projecting the premium payment, and the correct calculation of an annual premium for the above insurance requires that the result of the formula is divided by an annuity value that also depends on the interest i and mortality assumption q . The formula for this annuity value is

$$\sum_{k=0}^{n-1} v^k {}_kp_x$$

So the annual risk premium of an n -year term life insurance for a person aged x that pays S on death is

$$S * \sum_{k=0}^{n-1} v^{k+1} {}_kp_x q_{x+k} / \sum_{k=0}^{n-1} v^k {}_kp_x$$

In case of a mixed endowment insurance policy that pays S , both if the insured person dies within the duration of the insurance and when the person does not die, the net risk premium is calculated as

$$S * \left(\sum_{k=0}^{n-1} v^{k+1} {}_kp_x q_{x+k} + v^n {}_np_x \right) / \sum_{k=0}^{n-1} v^k {}_kp_x$$

Long term insurance policies are often used when asset accumulation is desired as well as mortality protection. However, although both are also needed by low income households, endowment policies are still not that common in microinsurance (but becoming more popular of late) for reasons described in earlier chapters. In addition to more complicated pricing, this business requires much more sophisticated

reserve calculations and asset management skills, as part of the premium that needs to be set aside to pay the survival benefit.

4.2.2 Expected claim amount

The *expected claim amount* is also known as *expected amount of insurance claim*, *average claim* or *expected claim cost* (but shouldn't be confused with the cost of settling claims). It is the benefit amount that the insurance programme will pay if a claim occurs.

Expected claim amount can be easy to calculate if the insurance benefit that will be paid on occurrence of the insured event is known beforehand. For example, in life insurance the sum that the insurance will pay on occurrence of the insured event is agreed upon beforehand, as a fixed sum in the simplest case or as a variable sum that will be determined by a predictable process such as outstanding loan amount or amount outstanding to achieve a savings target.

For short term products (ignoring the time value of money) it does not make a big difference if the sum insured is paid in one instalment or in a series of instalments (a sum insured that pays 12 monthly instalments of 100 is 1,200). For some kinds of disability, personal accident, agriculture, livestock or property insurance the expected claim amount is also defined as a fixed monetary sum at the outset. In all these cases the risk premium is obtained by multiplying the likelihood of the insured event happening with the known amount that the insurance will pay:

Formula (2)

$$\text{Risk premium} = [\text{likelihood of insurance claim}] \times [\text{sum insured}]$$

Box 4.8: Calculating sum insured for credit life: a simplifying method

Credit Life insurance provides an example of how to simplify matters in cases where the sum insured is not fixed: while it requires some calculation to determine the outstanding loan amount to be covered by insurance at time t of the repayment schedule, it is straightforward to determine the total amount of loan outstanding at any month end – if all borrowers were to die in that moment, this is exactly what the insurance would pay overall as Credit Life usually covers all borrowers. Therefore, to determine the scheme's total insurance premium for one month, the total sum insured (approximated by the outstanding loan amount at the beginning of the month) is multiplied by the likelihood of a borrower dying during the month.

For practical reasons it is usually assuming that the likelihood of death is the same for every borrower, and the monthly total insurance premium is calculated as:

monthly total insurance premium = [likelihood of borrower 1 dying during the month] times [outstanding loan amount borrower 1] + [likelihood of borrower 2 dying during the month] times [outstanding loan amount borrower 2] etc.

= [insurance premium borrower 1] + [insurance premium borrower 2] etc.

= [monthly likelihood of insurance claim per person] times [total outstanding loan amount]

If all the borrowers of a MFI are covered by the same credit life insurance, this formula is very easy to calculate, as the total outstanding loan amount is well known at all times to most MFIs.

This method is an over-simplification and should only be used to get an initial rough estimate. For determining a group's risk premium, more sophisticated and thorough methods described in this guide should be used.

There are, however, cases where the amount payable by the insurance is not known beforehand, typically in health insurance. In the case of health insurance, not only is the likelihood of any person using health

care services in a year a random event that can only, as discussed above, be predicted for a large enough group, but also the cost of that health care service is random and unknown beforehand. Many people will have a common cold, a few will have appendicitis, and very few will have bad accidents with multiple trauma or burns. The expected claim amount of insurance that covers the corresponding cost will be highly variable in each case. In this situation determining the expected amount of the insurance claim is more complex. Past experience, based on the actual cost of insured health care events among the target population and with the same providers, is in that case valuable information. The pricing-specialist must, however, adjust these numbers for medical inflation. Reimbursement or replacement of damaged or lost assets is similarly challenging.

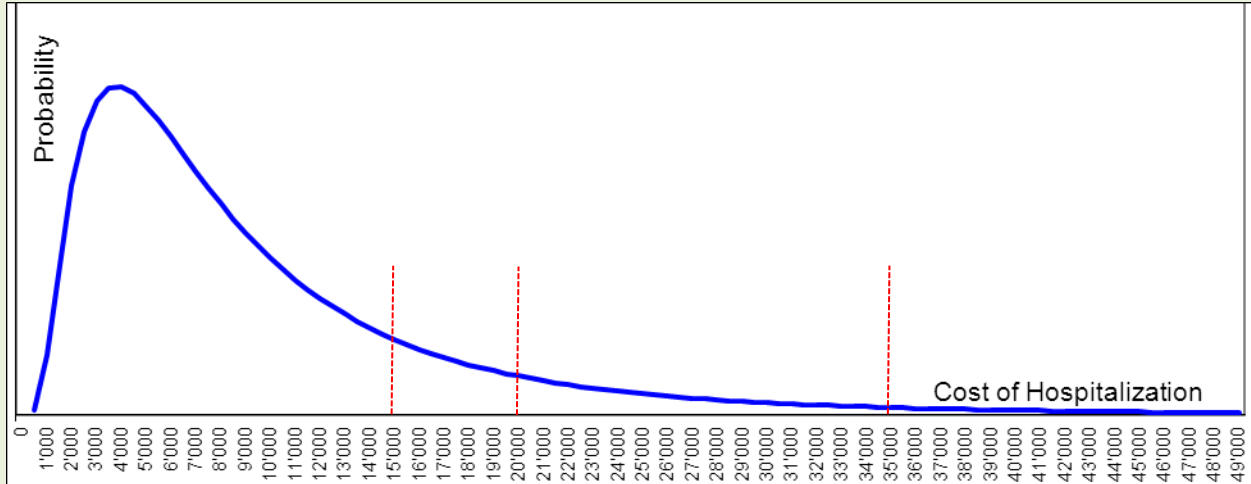
There are cases where one single number representing the average of all claims expected is not enough. It is, for example, normal for health insurance to have maximum benefit limits. The most common maximum limits are the benefit that can be claimed per person and / or per family per annum. Other common limits are the amount that will be paid per one health episode or for a particular procedure such as surgery. It is very important to quantify the impact of changing any such maximums since this change has a direct effect on the risk premium. Similarly, introducing a deductible or changing co-insurance level impacts the risk premium since these features impact both frequency and claim amount.

Formula (1) also provides the answer in these cases, but the expected claim amount and frequency need to be suitably modified to reflect the new restrictions: the expected future cost of an insured hospitalization subject to a limit of X , rather than the expected future cost of an insured hospitalization.

The impact of changing a benefit maximum on expected claim amount is not that difficult if the available data is complete and granular (detailed) enough. Predicting the effects that the change would have on incidence is much more difficult. In most cases the pricing specialist does not have access to such detailed data anyway. Therefore, it is useful to remember that future insurance claims are random events that can be modelled by probability distributions. As mentioned above, a probability distribution is a model t of how likely each outcome of a random event is for a large number of events. For example that the likelihood of any one side of a die showing up when rolled is one sixth. Such distributions can be generated from actual experience by tabulating the number of cases per cost range (: X cases, 501 per 1,000: Y cases, 499 per 1,000 and so on). In that case the result would be a bar chart rather than a smooth curve. Another method is to assume that the claims cost distribution follows an analytical formula. Mathematical statistics provide a variety of such formulae and the reasoning behind their suitability for modelling the distribution of insurance claim sizes. The advantage of using analytical probability distribution functions, such as the lognormal distribution, the exponential distribution or the Pareto distribution, is that it is then easy to calculate the impact of limits or deductible to the expected claim insured.

Box 4.9: Example of using a probability density in health insurance pricing

Below is a typical probability density for cost of hospitalization (Lognormal distribution, with an average cost of 10,000 and a standard deviation of 0.8).



In this case, the average cost of hospitalization is 10,000, but the graph shows that the most frequent cost is in fact 5,000; almost 5% of hospitalizations will cost 5,000, and 25 out of 100 hospitalizations will cost no more than 5,000. It also shows, however, that there can be much more expensive hospitalizations, even if they become increasingly infrequent.

Assuming the claims cost distribution in the above graph corresponds to an insurance product where the likelihood of claim is 5%, the table below shows calculation of the risk premium for different level of benefit limits:

Benefit limit	Expected claim cost	Risk premium (5%*Expected claim cost)
15,000	8,539	427
20,000	9,181	459
35,000	9,812	490
50,000	9,943	497
75,000	9,989	499

Calculating the tables in this box, for example with Excel, is not straightforward, and interested readers should refer to statistical textbooks for guidance on how to use analytical distributions to compute expected claim costs. There are many analytical distributions that can be used for that. Their general advantages usually relate to the number of parameters they require: more parameters (such as mean, standard deviation, skewness) allow to better fit a curve to observed data, but make calculations more difficult. Whenever there is some data available (for example from a comparable health microinsurance scheme in another country where the cost of treatment is consistently lower or higher), different analytical distribution functions should be tested for best fit. This is usually not done with Excel but with more specialised software and requires statistical knowledge.

In the example, as the benefit limit increases, it becomes less and less relevant: at 75,000 it is almost the same as the product of the frequency and the (unlimited) average claim cost.

The impact of deductibles on risk premium is even more. Calculating this from past experience, adjusted for inflation, may be difficult, depending on the availability and quality of data. Assuming the claims cost follows an

Box 4.9: Example of using a probability density in health insurance pricing

analytical distribution, then by contrast, the calculation allows quantification of the impact of different deductibles on the premium.

Benefit limit: 20,000			Benefit limit: 50,000		
deductible	Expected claim cost	Risk premium	Deductible	Expected claim cost	Risk premium
1,000	8,181	409	1,000	8,944	447
3,000	6,246	312	3,000	7,009	350
5,000	4,590	230	5,000	5,353	268

4.2.3 Risk loadings

As described in section 3.1, a *security loading* is usually added to address random fluctuations of the risk premium around the *true mean* of the underlying probability density or probability distribution of aggregate claims. There are many different actuarial methods to calculate the appropriate amount for this loading, with different advantages and disadvantages and varying degrees of complexity²³. It is important to note that there is no one formula that will address all of the possible issues that could cause claims experience to be worse than expected. In general the following should lead the pricing specialist to be more concerned about the claims estimate, and thus, more strongly consider using a higher safety margin:

- High volatility in the expected claims
- Higher uncertainty around the quantity and quality of the data used to set pricing assumptions
- Smaller amount of experience data

A second margin is often added to compensate for the uncertainty of the assumptions made in the risk premium calculation (call it *margin for error*). This margin is intended to address the errors that may have been made in estimating the true underlying mean (risk premium). The pricing specialist will have to make a judgement call on the magnitude of this loading. The following must be considered:

- How reliable, plentiful, and complete was the data used to derive the risk premium? Was the data confirmed and cross checked in some way?
- With what level of confidence were each of the major assumptions made? Were any of them wild guesses or is there a satisfactory degree of justification for each?

Formula (3)

$$\text{Net premium} = \text{risk premium times } (1 + \text{security loading} + \text{margin for error})$$

These two margins may not address all concerns related to an inaccurate claims estimate. If the security margin and margin for error do not account for all variations, some practitioners may wish to add other risk loadings for specific causes of uncertainty. Some organizations might set uncertainty margins for several underlying variables rather than on an aggregate basis, but they need to be reasonable in total. As additional and/or larger safety margins or risk loadings are used, it is important for the pricing specialist to balance financial security of the programme with affordability.

²³ Such as VaR (Value At Risk), TVaR (Tail Value at Risk), discounting methods, or double expectation formula

Formula (4)

$$\text{Net premium} = \text{risk premium times } (1 + \text{security loading} + \text{margin for error} + \sum \text{other margins})$$

The risk of catastrophic accumulations cannot be suitably addressed by adding more margins. The only protection against this is diversification, either within the book of business of an insurer (if it has exposure to different geographic areas where catastrophes will not happen at the same time, or when it has exposure to different lines of business that will not all be affected by the same catastrophe), or ideally through reinsurance if available.

There is some implicit protection against catastrophes as well. For example, if there is an earthquake, many more people than usual need health care services but there may be few facilities that have not been damaged. In any case, there is probably not enough capacity to meet the demand after a large scale event. This implicitly protects the microinsurance programme from a financial shock but sadly, the insured population may not be getting the care they need and expect. Also, in cases of natural disasters there is often government and donor aid to provide better relief than insurance could. In many cases insurance policies actually exclude natural catastrophes and some other large scale events such as wars. This is a sign of protective risk management, often dictated by reinsurers, but somewhat conflicting with the social mission of microinsurance.

Reinsurance can also be used to decrease the need for, or the size of margins. Reinsurance essentially increases the pool size by pooling several different sets of comparable insured units, thus reducing the likelihood of random deviations in the larger pool. The feasibility of this solution depends on the line of business and other circumstances. The pricing specialist needs some understanding of reinsurance which is briefly discussed in section 4.5.

Another approach to deriving desired margins is using modeling techniques. Insights may be gained by studying the behaviour of a simulation model, especially when the model is stochastic (see next section). The model, while artificial, compresses time and produces experience results over many years. It is driven by the statistical nature of numerous underlying assumptions. Such an approach requires more than basic Excel skills and elementary calculus.

4.3 Using a model

As said in Section 3, pricing, product development, and preparation of financial projections are concurrent, forward-looking and interconnected activities that occur prior to product launch. Integrating pricing with product development and projections can be done more effectively if the time is taken to build a customized model for this purpose.

4.3.1 What is a model?²⁴

A model is a simplified version of a real world system or process, represented through formulas or equations. Using a model for pricing enables the pricing specialist to investigate possible outcomes without having to carry out actions in the real world, and allows a much deeper understanding of the interrelation of various parameters relevant to the insured risks. A model provides an “X-ray” of the

²⁴ The material in this section is based on Chapter 1 of the following publication, and the reader is referred to this chapter for a more in depth treatment of the advantages and disadvantages of actuarial models:
UK Institute of Actuaries and Faculty of Actuaries. 2012. Core Reading for Examination CT4 Models (The Actuarial Profession)

underlying mechanics of an insurance programme, showing how product features, premium, growth, persistency, portfolio composition, expenses and other determinants are likely to shape the financial outcomes.

By using a model, constraints and objectives such as the range of premiums that the market is willing to pay, minimum desired profitability, target rate of surplus accumulation, and so on can be simultaneously incorporated into the pricing exercise. Multiple products may be included in the same model and priced simultaneously. Once the model is built, product features and premium may be fine-tuned until the objectives are met within all applicable constraints.

Basic insurance products can be priced without preparing financial projections or using models. However, incorporating business objectives and plans into pricing is a more comprehensive approach, and usually worth the effort. Pricing for more complex insurance products almost always requires some form of actuarial model. In addition, microinsurance providers and regulators often expect detailed financial projections, and this usually requires developing some sort of model, no matter how simple.

Whenever a model is used, it should be understood how it is constructed, what the required inputs are, how the calculations work, and be able to confirm the various outputs using alternative calculations.

In the following chapter, typical data requirements for pricing, with or without a model, are described in more detail. While the data requirements are almost identical, some of the data may be used differently for the modelling approach. Depending on how the model is designed, the interactions between various data may also become more apparent and influential on the outputs through modelling. In fact, one advantage of a good model is that it may reveal sensitivities and interactions that could otherwise not be easily identified.

4.3.2 The main steps in modelling



Step 1: What are the objectives of the model?

Objectives need to be well defined in order to ensure the model is designed to meet its intended purposes. Some questions to consider are listed below, but the objectives will be unique to each model and project:

- What decisions do we want to be able to make using the results of the model?
- Do we need the model to be extremely accurate or is it more important to ensure that certain risks are not understated?
- Will the model generate premium rates or will the user need to input premium rates and test them on a trial and error basis?
- Will the model create simulated financial statements including profit and loss results?
- Will the model allow us to estimate required capital?
- Do we want to be able to test different scenarios for different input variables?

Step 2: What data do we need as input for our model? What is the quality of the data that we have?

This step is often the same whether pricing is done with or without a detailed model. Data requirements and evaluation will be discussed in further detail in Chapters 5 (for the net premium) and Chapters 8-9 (for the gross premium). This step requires judgment as to the relevance of observed data to the future environment. The quality of the available data is crucial; poor data quality will most likely result in flawed output from the model.

Step 3: What assumptions do we need? Is it a deterministic or a stochastic model?

Setting assumption involves determining appropriate parameters for the input variables to the model, as well as the relationship between different variables, and how they might change over time. Several types of assumptions and methods for setting them are discussed further in Chapter 6 (risk premium) and Chapter 8 (gross premium).

In a deterministic model, the outputs are determined as soon as assumptions for the set of fixed input variables and the relationships between them have been defined. The result is a single fixed set of outputs, which could be considered equivalent to the results from one possible scenario.

In contrast, a stochastic model is one that recognises the random nature of the input data, and models them as random variables using appropriate probability distributions. Each result is a snapshot of the output given a certain set of inputs, and many independent runs are used in order to create a distribution of results from a set of possible scenarios. With a sufficiently large number of runs, statistical theory can be used to analyse the output, determining, for example, a sample mean and variance of the net income ratio, the probable maximum loss, or the sensitivity of the outcomes to changes in certain variables.

For example, a likely input variable could be a claims frequency rate, as discussed in earlier in this chapter. Depending on the nature and complexity of the model, this assumption might be represented as a single fixed value or as a probability distribution. It could be assumed that the parameters stay the same for the projection period, or that they vary over time. Its value might be linked to other variables in the model, such as the size of the insured group (individual, family, community), or the number of years of coverage for a given insured.

Therefore, in setting appropriate assumptions, the pricing specialist will need to consider:

- The relationships between various parts of the model
- Whether the variable is deterministic or stochastic (a stochastic model may still include a number of deterministic assumptions)
- The length of the projection period
- The inter-dependence of results from one period to the next; for example, an increase in the inflation assumption might be expected to lead to an increase in the expected claims assumption for the subsequent period
- How to incorporate parameter assumptions that cannot be derived from data

Step 4: Programming the required calculations: what tools or software should be used, and how do we design the needed formulas?

The choice of software will depend on the desired complexity of the model as well as the resources available. Excel can be used to create both simple and relatively sophisticated models, depending on the

user's ability to programme in Visual Basic. Software applications such as @Risk can be added to Excel to provide Monte Carlo simulation capabilities.

Actuaries frequently use complicated software modelling tools such as MoSes, Prophet or Axis, which are specific to insurance and include the ability to model the complex features of conventional insurance products. There are many developers of actuarial software, but the power and complexity of these applications is not usually required for the simpler products in the microinsurance sector.²⁵

Once the software tool has been selected, the developer needs to programme the formulas and calculations that link together all of the required assumptions, as well as the impact of product features such as maximums, deductibles, or reinsurance.

Step 5: Model validation

Programming comes with its own set of potential errors, and it's important to fully test a model to ensure that the calculations have been programmed correctly.

Sensitivity testing involves testing changes to a single input variable at a time, and ensuring that all of the related outputs are consistent. The model should be reviewed in particular if small changes in input variables or their distributions cause large changes in the outcomes. Such sensitivity testing can often reveal unexpected consequences of changes in input assumptions, and can also be useful in setting appropriate safety margins for net premium calculations.

Testing can also involve more global "reasonableness" checks to ensure that the output resulting from changes to multiple and/or correlated variables make sense.

For a stochastic model, statistical methods can be used to validate the results of several sets of simulations, where each simulation includes many scenarios. For example, the observed mean of an output variable from a simulation of 1000 scenarios should not differ substantially from one simulation to the next.

Step 6: Test the model output

At this stage, it's important to review the original objectives for the model and ensure the output meets those objectives. It's also important to ensure that the output is reasonable, given past experience or real world examples.

One way of testing a model is to use the actual historical data used to derive the assumptions for the model. If the historical data is used as input, are the corresponding outputs consistent with the past experience?

A general reasonableness test can be applied by testing output against comparable products or results that might be available. For example, if the model for a term life product generates a 20% profit for a given input premium rate, both the premium and the profit margin can be compared to similar products to ensure the model is producing results within a reasonable range.

If there is a real world system against which results can be compared, a "Turing" test could be performed. In a Turing test, experts on the real world system are asked to compare several sets of real world data and

²⁵ @Risk by Palisade; MoSes by Towers Watson; iWorks Prophet by SunGuard; AXIS by GGY. There are many more.

data produced from the model, without being told which is which. If these experts can tell the difference between the real world and model data, their techniques for doing so could be used to improve the model.

Box 4.10: Example of an actuarial model: A survivorship model

An actuarial survivorship model is a deterministic model that projects insured units over time, including relevant assumptions for, at minimum:

- New entrants
- Deaths
- Renewals
- Claims
- Terminations or withdrawals
- Lapses
- Reinstatements

New entrants are modelled based on assumptions for growth and sales targets. Depending on the level of detail required by the model, additional assumptions may be necessary, for example: timing (are sales evenly spread throughout the year or concentrated in a single period?); age and gender distribution of new clients; family composition of new clients; etc.

Deaths are modelled using a mortality assumption, which may be a single mortality rate for all insured units or vary by age and gender, depending on the availability of data and the relevance of mortality for the product. For example, for life insurance benefits, mortality is a key assumption and should be modelled in as much detail as possible (even if premium rates are the same for everyone). For health products, mortality assumptions do not generally affect claims assumptions, but they are needed to correctly account for policyholders that are no longer covered due to death. In this case a simpler assumption is acceptable.

Renewals must be modelled separately from new entrants, as premiums and benefits often vary by year of coverage. Claims may also vary by year of coverage, particularly for microinsurance products where utilization of insurance benefits may be quite high in initial years and then level off. Modelling renewals as an explicit assumption allows other assumptions to be set in relation to it, and also lends itself toward appropriate monitoring of renewal rates.

Claims assumptions for frequency and claim amount are usually needed to fully model expected claims: the number of claims reported and paid may be correlated with other variables such as claims adjudication expenses, whereas the total amount of claims paid affects claims ratios and net profit. Claims may also be specifically modelled based on policyholder composition assumptions (such as age, gender, family status etc.).

Lapse is a transitional decrement that refers to the temporary status when a premium payment is due but has not been paid, although coverage remains in affect due to a grace period with a duration ranging from 15 to 60 days

Withdrawal results from a formal notice of cancellation or an automatic cancellation of coverage once the grace period has expired.

Reinstatement refers to reactivation of membership in a mutual or reactivating insurance coverage in a non-mutual programme after penalties and (possibly) past due premiums have been paid. Often, reinstatement is only possible within a limited period from the withdrawal date.

When a modelling approach is used for pricing, it is necessary to track lapses, withdrawals, and reinstatements for each “cohort” in the model (each group of new policies, such as the new sales in a year, will form a unique “cohort” of insured units). While these rates are normally a function of the duration since the coverage began, they could either remain fixed (and thus be viewed as average or expected rates) or they could be randomized and allowed to vary within pre-set ranges. This is not a requirement for setting initial prices but it may be useful for more detailed financial projections or a better understanding of the effects these decrements have on long term results. For example, retention tremendously affects the expense ratio, profitability, financial value, and surplus accumulation of a programme.

Box 4.10: Example of an actuarial model: A survivorship model

Appendix 1 illustrates an Excel / Visual Basic model that was used for pricing an accidental death and hospitalization product.

4.4 Reinsurance

Reinsurance is an important management tool for a risk-bearing organization, which it can use towards furthering the objectives in its business plan. In commercial life insurance these objectives include:

- Spreading of risk, i.e. minimizing the concentration of risk
- Stabilizing aggregate claim experience
- Reducing surplus strain caused by new business
- Smoothing of operating results
- Reducing the probability of insolvency
- Minimizing potential for catastrophic losses
- Transferring investment risk or lapse risk of individual long term life and endowment policies
- Taking advantage of reinsurers' technical and underwriting expertise
- Transferring or selling certain classes of business
- Increasing the ceding company's capacity for growth
- Minimizing taxes where reinsurance may reduce tax liability
- Getting assistance from the reinsurer with a new market.²⁶

Reinsurance should be purchased with a clear objective. The need for reinsurance should be identified during the analysis of the expected claims costs and result from a high variability of expected claims, a potential for high cost single claims (individual excess-of-loss) and/or a potential for large numbers of simultaneous claims (covariance risk).

Reinsurance must not be regarded as a magic wand that can be substituted for sound management by the primary risk carrier. It cannot be used to transform an ill-managed and unviable programme into a feasible one unless there is political will and reason to subsidize it. Such a case is not considered here, and the assumption remains that the aim is for a sustainable standalone microinsurance business, providing optimal value and responsiveness to market needs.

Reinsurance comes at a cost, which may be quantified as net reinsurance premium paid for cession of a block of risk less the total claims cost recovered from the reinsurer for the block upon its completion. Therefore, assuming that pricing is fair and based on the underlying risk, the risk that cannot be prudentially carried should be ceded.

Common forms of reinsurance treaties are:

- *Quota share*, also known as *proportional* reinsurance- x% of premium ceded; x% of claims recovered

²⁶ Lee, Kwangbong; Palmer, Bruce A.; Skipper, Harold D. Jr. 1992. "An analysis of life insurer retention limits", in Journal of Risk and Insurance, March 1992

- *Individual Excess of Loss (IXL)* also known as *surplus reinsurance*- if a single claim exceeds a fixed retention amount, the reinsurer pays excess claim amount
- *Aggregate Stop Loss (ASL)*- if total claims exceed a fixed retention (usually a % of premium), reinsurer pays excess claim amount
- *Catastrophic reinsurance*- The reinsurance treaty will apply only in case of occurrence of a catastrophic event (such as a natural disaster, or an epidemic).

Variations and combinations of those forms are often used to address specific risks.

For most microinsurance products the only reinsurance required is for protection from catastrophic events, and the cost of this should be minimal. This assumes that the risk portfolio is of ample size and is relatively homogenous in terms of risks covered, target markets, and amounts of individual insurance coverage. There are some cases, however, where individual IXL or proportional coverage is necessary. For example, some MFIs cater to a wide variety of borrowers, ranging from poor rural entrepreneurs organized into Grameen-style groups to salaried employees and medium sized enterprises. Here, excess-of-loss cover is desirable if the total portfolio is “small” and the variance in loan sizes is “significant”.

A second reason for microinsurers to partner with reinsurers is to increase the management and actuarial skills available to them by using the knowledge of the reinsurer. Reinsurers operate on a national and/or international scale and can therefore bring important knowledge and skills to assist with pricing and risk management.

Thirdly, microinsurers may source reinsurance in order to reduce surplus (not to be confused with surplus reinsurance) and capital requirements. Aside from prudential reasons, this is particularly important in countries where the legally required capital and surplus is assessed with risk-based methods and microinsurers find it challenging to comply.

There is no clear cut method to determine the appropriate retention limits for an insurer, nor is it a trivial decision, since it ultimately affects both risk exposure and profitability. The retention limit establishes the maximum individual claim amount that the insurer believes it can tolerate with its financial and operating characteristics. Reinsurers will often use stochastic models to quantify and price the risk in the reinsured layers.

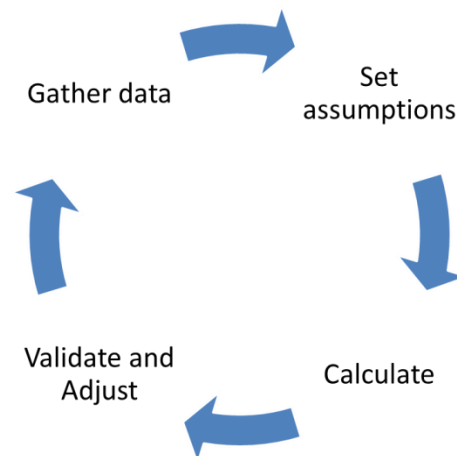
5. Sourcing the data for net premium calculation

Key messages:

- Spending time learning about and researching the context of the microinsurance operations and the target population should be seen as a crucial investment
- Get information from all partners (distributors, health care providers)
- Context is crucial for microinsurance pricing
- One needs to find the right balance between getting quality data and keeping data collection costs at a reasonable level

5.1 The objective of getting data

As mentioned in chapter 3, defining the net premium requires the following sub steps:



Sourcing data provides the input for all subsequent steps to calculate the risk premium. As discussed in the previous chapters, engaging in microinsurance is a (so far) little-trodden path, often with limited experience data for pricing. Sourcing input data to build the pricing model is essential, and both quantitative and qualitative information is needed to reach a proper understanding of the target population and be able to use sound judgment to make assumptions.

Regardless of product type, microinsurance serves a low-income population. There is an amazing diversity of contexts in which this population lives: they could be Bangladeshi farmers, Indonesian factory workers, Peruvian street-vendors or pursuing a livelihood in a semi-urban area of your home country. Their demographics and social characteristics may be very different, even within the same country. For example, a programme may have been developed in Northern Nigeria, but the Lagos poor urban population is very different; likewise, each Indian state may be considered a different country-context. Therefore, spending time on learning about and researching the context of the microinsurance operations and the target population will almost always be a useful exercise and should be seen as a crucial investment.

Data gathering to determine the risk premium has the following objectives:

- Collection of quantitative data which can be used to derive estimates of claim frequency and claim amount; this will include gathering demographic information on the target population and finding relevant information on mortality rates, morbidity rates, average cost of hospitalization, etc.
- Gathering qualitative and context data for adjusting the quantitative data: This often includes general information on the country and region (such as macro-economic data, information on the existence and reliability of infrastructure, and active financial and insurance regulation) as well as information on the attributes of the potential insured. Aside from evaluating the risks, this information will be used to set assumptions made for secondary calculations, such as the potential volume of premiums when elaborating financial projections, and the capacity of the target population to pay.
- Getting information to validate premium calculation. Preliminary research should also include a benchmarking exercise, to compare a proposed product with other accessible options for the population.

5.2 What data to collect

5.2.1 Which information is needed?

The information necessary to set the net premium depends on the context and the pricing specialist's knowledge of the target population. If products have already been sold in the target market, there may be some data available to which adjustments may be made for a pricing review or for developing new products. If the program is launching a microinsurance product in an unknown country or region, or if pricing is outsourced to consultants that are not familiar with the target population, deeper research will be necessary.

Gathering data for pricing should start with listing and prioritizing the information required to properly define and validate the price.²⁷ The list of data should include both quantitative information (such as age distribution or cost of hospitalization in empanelled hospitals), but also context information to enable one to adjust quantitative data to the characteristics of the target population. For example, electricity supply and density will be an important factor in estimating claim frequency in asset insurance. Vaccination patterns need to be understood for livestock insurance while age distribution, prevalent diseases, morbidity, and life expectancy will be vital for health and life products.

In all cases, stock should be taken of information available on which pricing assumptions can be built.

Table 5.1: Example of potential quantitative data	
Mortality rates	<ul style="list-style-type: none"> • Target population experience, if member of a MFI, for example • National mortality table • World Health Organization mortality table • Other country/region/scheme mortality data • Claims data if there is any
Health event incidence rate	<ul style="list-style-type: none"> • Target population experience • Health care provider data • National and international organization health surveys • Other health publication • Other country/region/scheme morbidity data

²⁷ Appendix 3 provides a template for listing and prioritizing information

Table 5.1: Example of potential quantitative data

Agricultural data	• National information from climate institute
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For **pricing life insurance**, the critical information is a suitable mortality table and past death claims history for the target population.²⁸ If claims data is available, it can only be of use if the corresponding exposure information is also available from the same source and over the same period. As well, knowledge of the demographic composition of the target market will be needed to further adjust the raw data, especially if this is from a different population. Date or year of birth and gender are particularly important, however other information such as residence (urban or rural region) and occupation (or type of livelihood) may also be desired if relevant incidences of covered risks are to be estimated by location and industry. Unlike for health and asset protection, it is usually not necessary or possible to price life microinsurance by location and industry.

For **pricing health**, if no experience data is available, one should try to get as much detailed claim information as possible from the health care providers, over a long enough period to enable trend analysis. Again, this can only be used to derive incidence rates if the corresponding exposure data is available. For analysing the cost of a claim when it happens, minimum data needed are total number of hospitalizations, average length of stay, causes of hospitalization, and the cost of each claim broken down by service category (cost of drugs, surgery, hospital room, etc.).

Often such data is not available, either because of lack of data capture at health care providers or lack of resources to get the information. Either way, secondary data provided by national and international organizations should also be sought out and used²⁹ either to compare population data to the target market data or derive rates from population data. To further adjust the raw data, data on age and gender should be gathered, as well as other environmental information, which will impact the health status of the population.

A population's health seeking behaviour and access to health care may also vary from one region and culture to another. One should always seek answers to the following basic questions:

- Are patients following the doctor's prescriptions?
- Do they often go to traditional healers and for which diseases?
- How long do they wait before seeking treatment?
- Are they close to a hospital?
- Do they pay high transport costs to get treatment?

The socio economic status of the population may impact the risk, but low income households are not always higher risk than wealthier ones.

Table 5.2: Relation between external factors and risk

	Examples of environmental issues	Related conditions
1	Urban and indoor air pollution	TB and lower respiratory problems
2	Lack of sanitation, drainage and waste disposal	Diarrhoea
3	Unsafe water	Intestinal/parasites/contamination and outbreaks of diseases
4	Malnutrition	Unbalanced diet, anaemia
5	Traffic, housing	Accidents

²⁸ Refer to section 5.1.1 for further detail on suitable mortality table

²⁹ One has to remember that the incidence of a disease and the incidence of disease treated at health care providers can be very different, depending on the health seeking behaviour of the population.

Table 5.2: Relation between external factors and risk		
6	Health prevention and promotion	Malaria, HIV, vaccination, non-compliance with long-term treatment
7	Occupation	At-risk professions
Source: authors' own information		

Box 5.3: Impact of environment on health incidence rates

In Myanmar malaria prevalence is high, but rubber plantation workers are even more at risk than the rest of the population as they harvest the hevea sap at dusk when vector mosquitoes are most likely to bite them.

Knowledge of such details may help refine expected incidences in premium computation when the target group is precisely defined.

Source: authors' own information

Box 5.4: Example from India

India has been observing an increase in the incidence of cardio-vascular problems, diabetes and cancers. This is more obvious in the ever-growing middle class than in the lower-income segment and also more obvious in urban areas (9%) than in rural areas (3%). The example of diabetes incidence (below) demonstrates that socio-economics can have an impact on medical conditions, but not necessarily a negative impact for low-income households, particularly where chronic diseases are linked to recently-adopted sedentary lifestyle trends.

Number of Diabetes Cases per 100,000 persons		
Wealth Quintile	Women	Men
Lowest wealth	371	705
Second	657	601
Highest	1503	1957

Source: NSSO 2005-2006

For **pricing livestock insurance**, one will need to find information to determine cattle values as well as mortality and morbidity by segment of livestock³⁰. Then, mortality could be adjusted by type of cattle and breed, as they are strongly correlated with mortality. Each breed is more or less adapted to a specific environment (for example indigenous cattle or those cross-breeds that have been specifically selected for the purpose, better withstand climatic vagaries in comparison to foreign varieties). The age of the cattle also has an impact on probability of death, and if an animal is pregnant, risks of disease and death are higher. The location of the animal may also impact its cost. Last but not least, the owner's capacity to provide adequate care for the animals impacts both the morbidity and mortality of cattle. Finally, the existence of a market to sell and purchase livestock will impact the price of the cattle. The availability and actual access to veterinary services, immunization of the cattle, training of the owners on best husbandry practices, government feeding programmes, and management of epidemic disease by the local authorities, all contribute, where available, to lessen morbidity and mortality rates .

Whatever the product, the one will need to have detailed information on:

- The target population, including demographics, economic situation and financial literacy
- Features of the context of the programme which may impact the risk, such as accessibility of services or inflation rate
- Client ability and willingness to pay and competitor offerings

³⁰ Data is usually scarce as governments do not always collect information, especially on epidemic diseases which farmers have no incentive to report.

5.2.2 Population information

Who is the target population?

As a first step, it is necessary to define precisely whom the product is intended for. This may depend on the distribution channel: a rural MFI, an NGO which supports migrants, a farmers' cooperative or a labor union, for example. The target market should be quantified in order to assess future coverage rate. Captive markets are easy to quantify, but the exercise becomes more complex when products are offered to the population of a specific zone (distributed through retailers or agents for example). General demographic information and segmentation of the population by revenue could be of help.

Definition of the target market should include economic, cultural, professional, geographical and sociological aspects, which will influence the design of products and processes and the risk profile of the population.

Demographics

While defining the target population, the general information as well as detailed facts and figures available on the target group should be reviewed. Some pieces of information and data may allow some comparison with other projects, and would provide a clearer picture of the needs and challenges to address. At the macro level the information to be collected includes:

- The population size (in the country, region or the urban area).
- The urban/rural split, as, for example, wages, medical costs and occupation will be different between rural and urban areas.
- The proportion of low-income people who work in the formal versus the informal sector; this figure will vary depending on the type of services, industries and economic situation of the region
- The distribution by age- in most developing countries the population is young and the median age low, but is the demography in transition? How many children do low-income families have on average, and is this factor changing?
- What is the common family composition (number of children, nuclear or extended family in household, usual age structure)?
- The social pyramid- out of the total population, what proportion falls in the middle-class, lower-middle class and poor or very poor households?
- The population density in the project area- high density means communicable disease may be more common, especially if infrastructure such as sewage treatment is not good; conversely, low density means scattered medical facilities, additional transportation costs and lower access to care providers.
- The education level-What is the average number of years of school attendance (by gender)?
- Do migrations have an impact on the low-income population? In India, villagers often leave their wife and children in order to seek work in towns, thus the demographics of this target group could be different by age and gender in rural areas in comparison to the regional/national statistics.
- The health situation of the population and the health care system, life expectancy and prevalence of major disease (HIV/tuberculosis...), as well as health trends. Are there regional specifics (diseases, malnutrition, criminality, pollution)?
- The living conditions (housing, sanitary, drinkable water, exposure to climate risks, difficulty of occupations, nutrition...).
- The level of security- is violence an important cause of accidental death? Is traffic a major cause of accidents?

- Is there any seasonality to the risk being considered?

Box 5.5: Definition of family varies depending on context

In Cambodia, a community-based health insurance scheme developed a comprehensive health product to address the needs of the low income population. As a way to limit adverse selection, families need to register all their members in the insurance scheme. But in rural Cambodia, a family cannot be defined as just the parents and direct children, as families may take care of relatives' children as well. The scheme defines the family as the head of the family plus his/her wife/husband, the unmarried children living in the same house and a maximum of two of their own parents.

Not only should one know this information but also how it has evolved over time, in order to assess how it may change during the period for which the work has to remain valid. It is important to look at the current data and also read up on the trends which have been observed over the past 2-5-10 years on the above-mentioned topics.

In order to understand values, needs and priorities for the local population, the following themes may be explored:

- Do religion and beliefs impact insurance acceptance? Some people may view insurance as bringing bad luck (i.e. occurrence of risk will happen because insurance purchased) or Muslims may consider insurance 'haraam' (i.e. forbidden on religious grounds) except if "takaful" (based on Islamic cooperative principles).
- What are the main elements of traditions? What are the important events for the target group? What do people value? Such understanding, if incorporated into the communication strategy of the scheme, may improve take-up. The pricing specialist may work with the implementation team to see if they have taken tradition into account in their communication with potential clients.

This list is not exhaustive. Importantly, one must be able to determine which factors would have an impact on the incidence of diseases, mortality, probability of damage to goods and so on, depending on the cover to be offered. Time should be spent exploring those factors which could increase or decrease the risk profile.

In order to really grasp the reality of the target population's life, spending time in the community is indispensable. One needs to understand the daily life of the target population, its living conditions, economic constraints, difficulty in accessing public services, basic understanding of financial products, and its local and community cultural context.

Economic situation

Similarly, a picture of the economic landscape will contribute to an understanding of the potential insured' economic life and environment. As they will have to assess if the premium is affordable and suggest changes to product and processes if it is not (while still providing a valuable cover to the potential insured), it is necessary for the pricing specialist to have benchmarks of income, but also of some economic facts and indicators.

It is important to document the main economic activities in the region. If agriculture is a main activity, what are the crops, the cycles/seasons? If not, are people engaged in craftsmanship, fishing, commerce, small production? This should enable the estimation of average income in the target population. In the case of MFI-formed groups, incomes may vary a lot within groups (even among joint-liability groups). Daily and weekly wages, crop revenues, annual income, should be assessed. From the occupation and the income, the living standards of the target population should become clearer.

For greater understanding of revenue pattern one should consider researching:

- Who is the income earner (father/mother/young adults/migrant worker)? This would be useful information for marketing purposes, for example
- What are the main expenses for the households?
- How does the family plan its expenses?
- What is the family's capacity for savings and how do they save (in the rural areas, savings are often kept through buying livestock)
- How does the family cope with unexpected expenses? (Do they borrow from neighbors or moneylenders? Do they have access to savings or sell assets?)

Frequency of income is an important feature which will impact premium frequency adequacy. It could also be interesting to know if certain periods in the year are expenses-intensive (like December in many Christian regions), possibly leading to premium payment difficulty.

Aside from assessing revenue it is necessary to also assess the cost of living. Cost of living will determine the level of benefit one needs to consider, but may also help assess the premium level which will be reasonable for a household. For example, it is important to compare the cost of the premium with the cost of transportation to comply with some of the insurance processes.

Depending on the product being considered, it is possible to collect data on, for example:

- Cattle types and values, household and small enterprise assets;
- Health and funeral expenses;
- Financial support for a family required after a member's death?

It may also help to know the cost of basic food, rent, travel to school, cell phone expenses and so on in order to compare those with the premium amount. It can even be interesting to use this information in education and marketing tools.

Financial literacy

Access to financial services is an important dimension for microinsurance implementation. There may be a high penetration in the region of MFIs or Savings And Credit Cooperatives (SACCOs), which offer loans or savings options. Relevant questions include:

- What is the landscape of MFIs?³¹
- What proportion of the population has access to MFI services?
- Are MFIs authorized to collect savings? (E.g. India's MFIs and Non-Banking Finance Companies (NBFCs) cannot accept deposits, while in Bangladesh the same institutions can).

In some countries, banks are required to open branches in rural areas to increase service access to the rural population. In towns and cities banks and ATMs are sometimes becoming more common. If this is the case:

- Does the low-income population have access to savings accounts at rural bank or postal service outlets?
- What are the rates of bank access in the country?
- Are banks authorized to deliver insurance?

If people can and are used to using financial services, understanding of insurance should be higher and insurance processes can be simplified.

³¹ You could refer to the MiX market, a website which lists the main MFIs per country: www.mixmarket.org/

Assessment of financial literacy of the market and past experience with insurance is important. It is useful to know if the target population has received training on financial education, or if previous programs have offered insurance in the past, and the population's experiences of this.

5.2.3 Context information

Macroeconomic information

Gathering context information should start with a review of main macro-economic indicators like economic growth rate and inflation rate. If a product is to be developed in a context of high inflation, then it may be necessary to revise every two to three years. For life insurance, increased cover would require a price adjustment which may be proportional or not. Inflation of health care costs are often higher than economic inflation and this, as mentioned in earlier sections, must be accounted for in the price.

General figures on country level of development, main health indicators, breakdown of the rural and urban population or the percentage of the population under the poverty line should be gathered (refer to appendix 3 – Data Checklist).

Information on the financial and insurance landscape and regulation is also required. This should address questions such as:

- Is there coming regulation on microinsurance, and how will it impact microinsurance operations?
- What entities are authorized to deliver insurance? Banks? MFIs? Mutual programs?
- Are these entities authorized to pay through cell phones?
- What is the regulation regarding insurance intermediaries?
- Is the regulator flexible to enable the success of microinsurance? This may mean an opportunity to test models that may not yet have been approved.

Infrastructure

Information on infrastructure development and its impact on the target population is needed. Some development issues are due to (or symptomatic of) inefficient infrastructures. The distribution of products, roads and healthcare facilities are among the factors which can impact on both the cost of claims and incidence rates. The relevant infrastructure elements to consider will depend on the insurance product being developed.

The following are examples should be documented if relevant:

- Distribution of health care facilities (how far is your target population from the nearest hospital);
- Quality of roads and cost of transportation;
- Access to internet (is internet access for microinsurance distributors reliable, so that they can scan documents and share them with their partner risk carrier or third party administrator (TPA))?
- Penetration and usage of cellphones in the country (can cellphone technology be used to improve MI processes)?
- Access to irrigation systems.

Box 5.6: On the impact of infrastructure on claim incidence

In India the government provides vaccination schedules for cows, and vets are free and accessible. Controlled claim experience can therefore be envisaged for livestock insurance. In Kenya there is no access to vets and insurers cannot ensure cows are vaccinated properly. Developing livestock insurance in that context is much more complex.

Box 5.6: On the impact of infrastructure on claim incidence

In Cambodia, for the same benefit package, a community based health insurance scheme observed a higher hospitalization incidence in urban areas (0.138 per year per capita*), where hospitals are close to the population, than in the rural space (0.078 per year per capita*), where hospitals are remote from villages and of limited quality. At least some of this difference is probably related to access, while some could be due to higher incidence of disease in urban areas (stress, pollution, diet, etc.)

*Data from 2007

Information related to the achievements of the administration and government in the region could be of value, in order to check the availability of reliable data (for pricing weather insurance, for example), the potential for fraud (which may necessitate additional loading or set-up of adequate controls), the appeal of a protection cover (if social protection and public hospitals are not satisfying, a health programme may be more successful).

The following questions could be explored:

- How is the quality of public infrastructure and services? This may vary by region and type of public service (transportation, health, monitoring of government activities).
- Is corruption common? How is law enforcement?
- What are the ID documents available to low-income households?
- Is there a formal land and property registration system?
- What are the welfare programmes accessible to the target population (which complement the product)?
- What are the government's plans to improve its services and programmes?

5.2.4 Reasonability check points

Understanding the competition

The competitive options in the market must be well understood. In such a new market, competition from formal institutions may be limited, but households' informal practices will be the main competitor.

Understanding the competition will enable conceptualizing of propositions that add value to alternatives. It is important to compare the proposed premium amount with other options, as well as to assess the take up rate of the product. Take up rate will be highly correlated with the target population's level of exposure to financial services in general and insurance in particular.

For each risk the product will cover, the current coping mechanisms in place should be investigated. These may include loans from relatives, money lenders or MFIs, or savings in the form of cattle which can be sold. Informal practices vary from one country or region to another, and may include Rotating Savings and Credit Association (ROSCAs) or Accumulating Savings and Credit Association (ASCAs) or other member based funds or clubs.³² Successful products are often those that mimic informal practices but provide better value added services.

³² To know more about traditional mechanisms, please refer to Rutherford, S. 1999. The poor and their money: An essay about financial services for poor people (Institute for Development Policy and Management, University of Manchester). Available online at: <http://www.microfinancegateway.org/p/site/m/template.rc/1.9.28437/>

Box 5.7: Informal risk-sharing mechanisms in the Philippines

In the Philippines informal risk sharing to deal with funeral costs is a widespread practice, especially in rural areas, where 80 to 90 per cent of concerned households benefit from it. Within “Damayan”, a broader term for community support, relatives and friends contribute “Abuloy” (informal support for funeral) to a family who lost a member. The largest share is contributed by families who live abroad.

In most cases, contributions are made during a wake of nine days between the death and the funeral. Depending on the wealth of the household, the contributions range from 5 to 100 Philippine pesos (PHP) for more distant community members and as much as PHP 1,000 (US\$ 22) for close relatives or friends. The total amount collected for “Abuloy” ranges from PHP 20,000 to PHP 50,000 (US\$ 444 to US\$ 1111), but can be as high as PHP 100,000 (US\$ 2,222). Funeral costs in most cases range from PHP 50,000 to PHP 90,000 (US\$ 1,111 to US\$ 2,000). This can be adjusted downwards to PHP 10,000 to PHP 30,000 (US\$ 222 to US\$ 666) but this rarely happens. “Abuloy” often covers just the funeral costs and rarely leaves the family with additional resources to readjust their income generating strategies.

Source: Matul and al, 2011

Moreover, if previous microinsurance programs have been set up in an environment similar to the one being explored, one could learn from documentation which draws lessons from these experiences. This will help identify the pitfalls to avoid and the reasons why challenges may arise.

Estimating willingness to pay and capacity to pay

To ensure the premium meets the target population’s capacity to contribute and motivation, the willingness to pay (WTP) must be estimated.

In economics, WTP is the maximum amount a person would be willing to pay, sacrifice or exchange in order to receive a good or to avoid something undesired, such as pollution.³³ Several methods have been developed to measure consumer willingness to pay. These methods can be differentiated according to whether they measure consumers' hypothetical or actual willingness to pay.

Documenting current willingness to pay requires one to first conduct research on the offerings of potential competitors, either from other insurers (private insurers, cooperatives etc.), from informal practices or from social security programs, and the cost of those options should be estimated.

Recent behavioural economics research shows that individuals seem to have “mental accounts” for specific purposes (food, education, emergency funds). It is important to understand and estimate expenses on emergency coping mechanisms used by the target population (like buying a cow to cope with potential lack of income), as willingness to pay will probably relate to the amount people are dedicating to risk-coping mechanisms, and insurance may be part of the same “account”.³⁴

Where there are no competitors, as is often the case, it is worth investigating the WTP of the target population through direct research. The following table outlines possible methods to determine WTP through surveys.

Table 5.8: Possible methods to determine WTP			
Elicitation format	Description	Pros	Cons

³³ Source: Wikipedia

³⁴ Dalal and Morduch. 2010.

Table 5.8: Possible methods to determine WTP			
Elicitation format	Description	Pros	Cons
<i>Open-ended formats (OE)</i>	Respondents are asked to state the amount that best matched their valuation of the hypothetical insurance package presented	Simple and easy method	<ul style="list-style-type: none"> • difficult to answer • low response rate • results are sensitive to outliers • compliance bias
Closed-end formats			
<i>Bidding game (BG)</i>	Respondent is asked whether s/he is willing to pay a specific amount. Depending on the answer, the bid is lowered or raised and the individual is asked about this new bid (“bi-directional BG”). This process continues until the maximum WTP amount is found. Alternatively, an “unidirectional” BG could be either <i>ascending</i> , in which case the initial bid is very low and is increased until respondents reject the offer; or <i>descending</i> , in which the initial bid is very high and is lowered until respondents accept the bid.	<ul style="list-style-type: none"> • easy and simple to answer • easy for people who are used to bidding for their daily utility goods 	<ul style="list-style-type: none"> • starting-point bias
<i>Dichotomous choice (DC)</i>	Respondent are asked to say whether they would pay a specified amount for a given commodity with “yes” or “no”. The demand curve is estimated by varying the bid amount across respondents, and the area under this demand curve represents mean WTP.	Simple and easy method; the respondent only has to make one or two choices	<ul style="list-style-type: none"> • results in higher WTP estimates compared to OE and PC • starting point bias • yes-saying bias
<i>Take it or leave it (TIOLI)</i>	Respondent is asked one question during surveys of large numbers of people. The data is then analyzed using econometric techniques to identify the shape of the distribution. The difficulties with this approach are in identifying the relevant range of sample bids needed for precise estimation.	Simple method; the respondent only has to make one choice	yes-saying bias
<i>Payment card (PC)</i>	Each subject is invited to select his or her maximum WTP from a list of possible values, which provides the respondent with a clear context for making the valuation.	<ul style="list-style-type: none"> • comprehensible context for making the valuation • can be self-administered • amenable to data collection (unsupervised or postal questionnaire) 	<ul style="list-style-type: none"> • range bias • anchor-point bias • mid-point bias • hypothetical bias • warm glow effect/social desirability bias
Source: David Dror and Rith Koren, Microinsurance Compendium volume 2			

If may be possible to conduct interviews and group discussions and ask about an acceptable level of premium. However one must remain cautious with the information collected: the WTP shared by participants is usually over-evaluated (people choose amounts higher than they are actually ready to pay on the day the distribution channel actually collects the money). It is also difficult for an inexperienced segment to assess the benefits of an insurance product; before proceeding, the advantages and the details of the cover will have to be explained in simple and clear terms.

Assessing ability to pay

As willingness to pay is linked to wealth, research should clarify the main sources of income and revenues of target households, and define their main expenses. As a reference point, one could consider that an insurance product targeted at the lower income market should have premium lower than 2% (for life), 4%³⁵ (for health) and 1% (for property) of the target market's individual income.

Another way to assess ability to pay is to compare the premium to the daily needs of a family, or to a non-essential expenditure. This comparison can allow one to infer if the premium amount calculated is a reasonable amount for the household to spend. The financial resources of households are very limited and the household often has little or no liquidity for unexpected or non-essential expenses. The allocation of its scarce resources is crucial and its ability to pay an insurance premium is very limited. Another criterion to assess is the ability of the target population to save in order to pay the insurance premium.

Willingness to pay, next steps

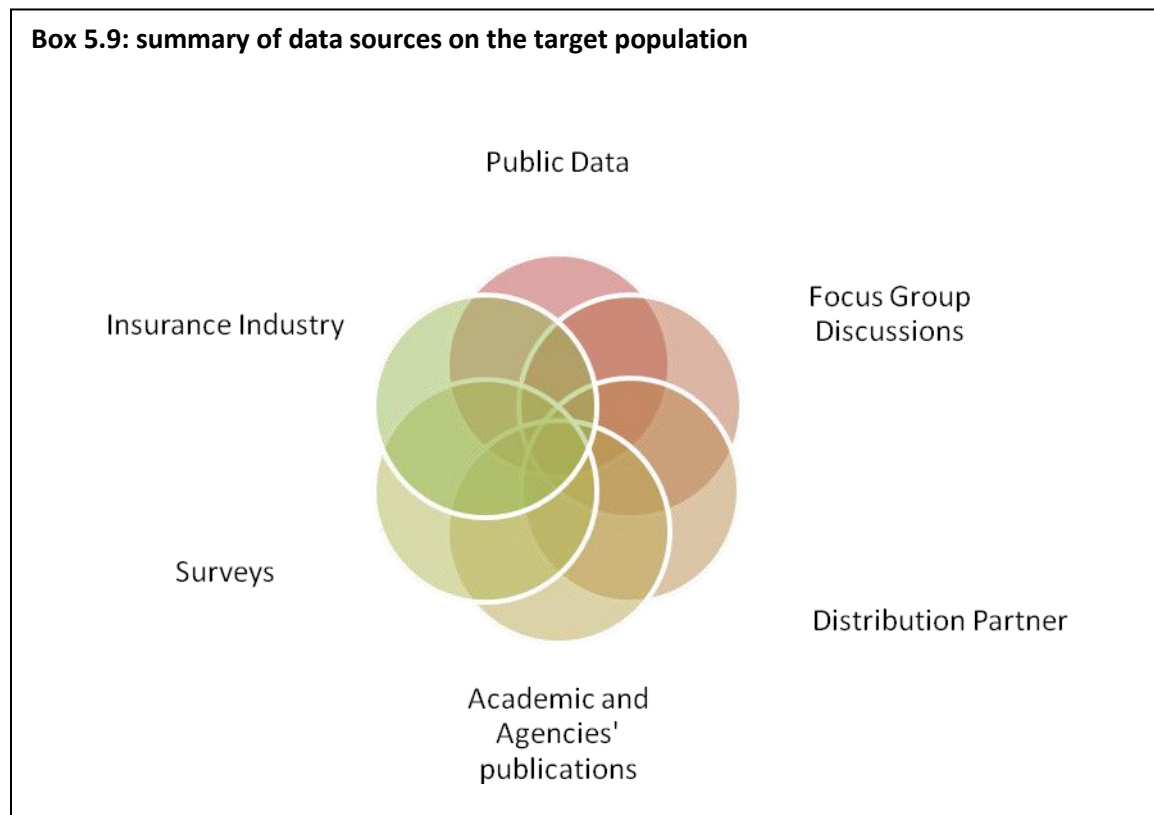
It is highly recommended to pilot test a product and price before rolling it out, to confirm if assumptions on willingness to pay are valid. The best information on the target population's willingness to pay will come from the sales data once the product is piloted. Extracting information on sales versus the profile of clients will be a useful exercise to better understand the buying behaviour of clients.

5.3 Where to collect information

Data collection should start with desk research. Direct research should always be done if possible; this will be used to complement the information gaps that emerge.

³⁵ David Dror and Rith Koren have analyzed available studies on willingness to pay and also highlighted the clear link between income and willingness to pay. All WTP for health microinsurance values were in the range of 1.35 per cent to 3.2 per cent, with a mean value of 2.2 per cent of the relevant income proxy.

The graph below summarizes the main sources of information to be considered:



During the data collection process sources of information should always be documented and stored, to facilitate validation and re-pricing exercises.

5.3.1 Secondary sources

The primary source of information will be experience data from monitoring, if the microinsurance provider has already provided insurance products to the target population.

Often in microinsurance the risk carrier partners with a distribution channel, which may have a lot of relevant data on the population. Distilling this information is crucial.

Two valuable international sources of information are the United Nations Development Program (UNDP) and WHO, as they compile yearly extensive reports on various indicators by country.

The WHO makes available life tables, which have been developed for all its member states for the reference year 1990, 2000 and 2009. These are produced through a systematic review of all available evidence from surveys, censuses, registration systems and so on. Procedures used to estimate the life tables differ for member states and depend on the data availability to assess child and adult mortality.³⁶ These can be downloaded for free, and are segregated in 5-year age bands which can be converted into annual mortality rates by age and gender.

³⁶ See www.who.int/healthinfo/statistics/LT_method.pdf

Ministries or national security programs should also provide some national or regional data which can be used as a master for the pricing.

In many countries census and health surveys are conducted every 3-5 years and the reports and data that come from these may be quite detailed and useful. The excerpt from the 2009-10 Timor Leste Demographic and Health Survey below provides excellent demographic information which is especially useful since the country is quite small and somewhat homogenous in rural areas. In larger countries such as India and Kenya, one should attempt segregate this type of information by region.

Household population by age, sex and residence

Percent distribution of the de facto household population by five-year age groups, according to sex and residence, Timor-Leste 2009-10

Age	Urban			Rural			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
<5	14.8	14.7	14.8	15.3	15.0	15.2	15.2	15.0	15.1
5-9	16.1	15.0	15.6	16.3	15.7	16.0	16.3	15.6	15.9
10-14	12.7	13.0	12.8	14.4	13.9	14.1	14.0	13.7	13.8
15-19	11.1	11.0	11.1	10.4	9.7	10.1	10.6	10.0	10.3
20-24	8.4	10.0	9.2	6.2	6.9	6.6	6.8	7.6	7.2
25-29	7.4	7.7	7.6	5.1	5.5	5.3	5.7	6.0	5.8
30-34	5.4	5.7	5.5	4.0	4.6	4.3	4.3	4.8	4.6
35-39	6.2	5.1	5.6	5.1	5.3	5.2	5.4	5.3	5.3
40-44	4.7	4.7	4.7	4.6	4.3	4.4	4.6	4.4	4.5
45-49	3.6	3.4	3.5	4.1	3.6	3.8	3.9	3.6	3.8
50-54	3.2	3.3	3.3	3.4	4.2	3.8	3.3	4.0	3.7
55-59	2.1	1.5	1.8	2.6	2.3	2.5	2.5	2.1	2.3
60-64	1.9	2.0	2.0	4.1	4.6	4.3	3.6	4.0	3.8
65-69	1.1	1.2	1.1	2.3	2.3	2.3	2.0	2.1	2.0
70-74	0.6	0.7	0.6	1.0	1.2	1.1	0.9	1.1	1.0
75-79	0.3	0.2	0.3	0.6	0.4	0.5	0.5	0.4	0.4
80+	0.3	0.6	0.4	0.5	0.5	0.5	0.4	0.5	0.5
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Number	8,072	7,618	15,689	25,555	25,647	51,202	33,626	33,265	66,891

Source: Timor Leste Demographic and Health Survey 2009-10

Information may also be available from the insurance industry and regulator. Some countries, like Colombia track information on microinsurance activity and provide information on claims ratio, average premium per type of product or number of policies sold.

Another source is research publications from academics, development agencies and funders covering aspects such as insurability, access to financial services, microinsurance and its target population.

Appendix 3 lists important websites to visit at the data collection stage.

5.3.2 Identifying gaps

Once the secondary review is complete, it is important to assess its quality and usefulness for the microinsurance context. It is necessary to:

- Understand **how** the data has been collected and the characteristic of the population described. This is fundamental in order to properly set pricing assumptions at a later stage.
- Validate the information by comparison with other sources and discussion with experts and the population.

Box 5.10: on interpreting public data

The government offers a compensation amount to farmers when one of their cattle dies. You are thinking of using the statistics from the Ministry of Agriculture as a starting point for your estimated claim frequency, but when you discuss with cattle rearers you realize that the compensation they receive is very low, so they do not always report the death of their cattle. If the data is used, assumed frequency will be underestimated, not due to moral hazard but because the initial information was not completely reliable.

Source: Matul and al, 2011

Once missing data has been identified it will become evident that information from another context is needed. For example, one may consider claim frequency from traditional business or from another country.

5.3.3 Primary sources

Quantitative survey

Almost always, detailed market research is recommended in order to confirm and augment existing information. Direct data collection (in the form of surveys) will improve the quality and level of detail needed to set assumptions. Direct data collection can be expensive and time consuming, and needs to be carefully planned.³⁷

Focus Group Discussion (FGD)

Since quantitative data of sufficient quality may not be available and obtaining more detailed and reliable data may be costly and time-consuming, the available quantitative data should be supplemented with qualitative data collected through FGDs. “A focus group is a form of qualitative research in which a group of people are asked about their perceptions, opinions, beliefs, and attitudes towards a product, service, concept, advertisement, idea, or packaging. Questions are asked in an interactive group setting where participants are free to talk with other group members” (Wikipedia definition). While respondents during FGDs and surveys may cite some amounts paid for different events, the accuracy of these amounts should be checked. Self-reported amounts should not be used as a unique base for this exercise, but may be used as a validation of other sources of data.³⁸

Meeting with experts

Interviews with key sources with a good understanding of the target population (e.g. NGOs, social workers and MFI staff) will be relevant both to get and to validate information.

5.4 Check for data reasonability

Once all data has been collected, the one should always try to validate the information by asking the following questions:

- Does the data appear reasonable based on judgement and experience in other contexts?
- Does the data appear internally reasonable? Has it been cross-checked to other sources such as an organization’s annual reports?

³⁷ Cf Lisa Morgan, 2010.

³⁸ It may be possible to check other data sources by asking about expenses over a short period of time since an event which is easy to remember (e.g. a religious festival, a harvest).

- Are there other sources of similar data to which it can be compared?
- Is it possible to observe how the data has changed over time and does this seem reasonable?
- Can peers provide feedback on the data results?

5.5 If the pricing exercise is outsourced

If pricing has been outsourced to external consultant, internal staff should be involved in the data collection process by:

- Providing relevant data to the consultants. This should start with a clear understanding of the information the consultant is looking for
- Understanding how the data was sourced. It is important to ask consultants to explain where and how data have been collected
- Assessing data quality to ensure the inputs are relevant for pricing

6. Setting assumptions for the risk premium

Key messages:

Setting assumptions refers to the transformation of data into pricing parameters. For example, population information has to be adapted to the target market for which products will be developed.

Some adjustments require mathematical calculations while others require more judgmental decisions.

The parameters in the net premium and gross premium formula are based on assumptions. These are calculated using suitable data or are set using careful judgement, or derived using a combination of both. Pure judgment, ignoring available data, is usually not acceptable. Therefore, efforts must be made to gather relevant data relating to the risk factors that influence insurance utilization or reflect past experience of other insurance programmes (or similar informal mechanisms) which are comparable in some or all aspects.

When the data is most suitable to price the insurance – most typically because it comes from the same programme’s past experience – then only minor adjustments may be necessary. But even in this case (experience pricing) past data may have to be adjusted to predict future claims such as when price inflation must be incorporated into projected claims. In all other cases – when the data was not generated by the insurance scheme, and especially when an insurance scheme is new and has no past experience – collected data should be evaluated with respect to its suitability and possibly adjusted for use in pricing.

Whether using experience or exposure pricing or both, defining the main parameters of the risk premium is the core work of the pricing exercise. This is different from deciding on the features of the product. Product design also requires choices, and the pricing process will assume the relevant product features (such as deductibles, premium payment frequencies or coverage limits), but this is not covered in this chapter. In this chapter, determining the input parameters for the premium calculation is the main focus.

Once data has been gathered, the next task is to decide what data to use. Often, there will be more than one set of relevant data, for example past mortality experience of differing granularity from the same country but different years and different sources, and past mortality experience of comparable microinsurance programmes but from a different country. Sound judgment, preferably guided by considerable experience, is required to decide which data is the most appropriate, and whether (and how) to combine different datasets.

This data distillation process tends to be unique to each situation, but some of the most common adjustments required in the process of transforming (raw) data into pricing assumptions (input parameters required by the formulae) are listed below.

6.1 Derivation of claim frequency

After deciding what data to use, transformation of the data may be necessary to suit the target population. The section below presents examples of how to estimate claim frequency.

When claims data is available, deterministic claim frequency can be calculated as follows:

Formula (5):

$$\text{Claim frequency} = \text{claim occurrence} / \text{risk exposure}$$

- (1) **Claim occurrence** corresponds to the number of insured claims in a determined period. There may be a need to omit or modify certain types of claims or events in order to consider certain features that differ from the data (new age limit, new exclusions etc.).
- (2) The **risk exposure** is the reference risk unit for which the claims experience applies during the same period. It is, for example, the number of lives insured during a period, or the number of livestock covered. A risk exposure needs to be proportionate to the insured risk and must be practical to use. For example, if family coverage is to be offered to MFI clients, it may be easier to use the client's life as a proxy for family risk exposure. This is simple to measure if all risk units were covered during the exact same period, but is less obvious when insurance can begin and end at any time of the year. In such a case, risk exposure will also include fractional exposures.

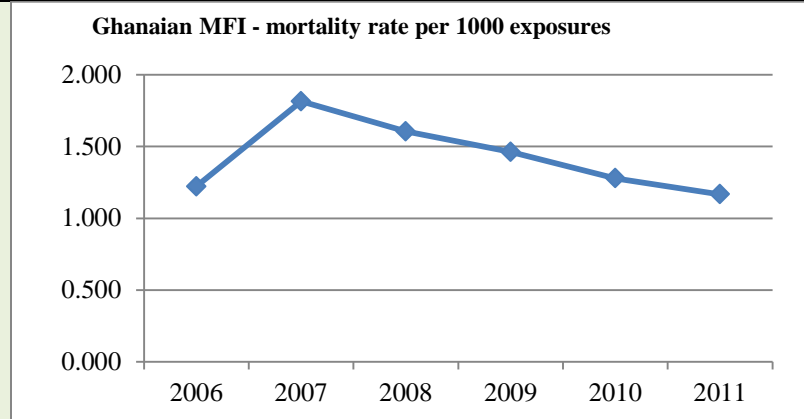
6.1.1 Life insurance

Box 6.1: Calculating a composite mortality rate

A MFI in Ghana provided the following data to an actuarial consultant for the pricing of a credit life product which was being enhanced by extending coverage to borrowers' families. As only borrowers had been covered to date, there was no experience available for spouses and children. The MFI provided loans exclusively to women and selected only borrowers that had been conducting their business for at least a year.

Year	Number of active members beginning of year	Number of deaths during the year	Estimated exposure for the year	Annual exposure increase	Rate per 1000 life years
2005	13,112	18	14,728.5		1.222
2006	16,329	32	17,636.0	20%	1.814
2007	18,911	31	19,309.0	10%	1.605
2008	19,691	30	20,511.5	6%	1.463
2009	21,303	28	21,905.0	7%	1.278
2010	22,479	27	11,250.5	6%	1.167
2011	23,770	n/a	n/a		n/a
TOTALS	135,595	166	117,226.0		1.416

Box 6.1: Calculating a composite mortality rate



In the illustration, the study period covers the years 2005–2010. Only partial exposure is credited in year of entry and year of exit, and a full exposure in the year of death. Since only an active borrower count is available at the beginning of each year and the entry and exit dates are not available, the assumption is made that all new entrants and withdrawals occur at midyear, thus just a ½ year exposure is credited. All of this can be accomplished in one formula. Let AB_x represent the number of active borrowers observed at the beginning of year x , and D_x the number of deaths in year x . The exposure for year x is thus simply $AB_x + (AB_{x+1} - AB_x + D_x) / 2$. For the year 2007, for example, exposure is estimated as $18,911 + (19,691 - 18,911 + 31) / 2 = 19,309$ life-years.

The composite borrower mortality rate over all years is $166 / 117,226.0 * 1000 = 1.4$ per thousand life years of exposure, a good first estimate of the likelihood of an insured person dying during one year. The trend is steadily downward after 2006. For pricing the new product, one might decide to use only the latter 3-4 years and then add a sufficient security loading, but it would be better to make such a decision only after understanding the reason for the observed decline. It may not be a trend at all, just a rare outcome. A justification that the trend is real could be made, for example, if the MFI had begun targeting only younger members after 2006, which could have offset the aging of existing active borrowers, depending on the growth rate in total number of borrowers.

When no experience data is available, WHO life tables can be used as a starting point for pricing life products. The actuary may prefer to blend it with a commercial mortality table, or perhaps even use a commercial table adjusted for microinsurance. In some countries, the regulator specifies which mortality table must be used for all regulated life products. In any case, depending on the type of product and target market, a WHO or commercial table should be adjusted as necessary using available information. For example, for an MFI without experience, one would carefully consider the methodology that the MFI uses to select borrowers to justify a downward adjustment³⁹ of the country's WHO life table, and then use this as a starting point for pricing. In such cases, it is still best to price conservatively to avoid having to raise rates in the future, and then as experience develops, lower the price (or raise benefits) as warranted.

Box 6.1: Pricing without experience in Cambodia

One MFI in Cambodia engaged an actuarial consultant to develop and price an enhanced credit life product which covered the mostly female borrowers with decreasing credit life as well as a fixed funeral benefit. A funeral benefit was also added for spouses and up to three children. Knowing that the MFI's field officers carefully selected only productive and reasonably healthy borrowers, and with only a customer profile and WHO life tables available, the consultant decided to set the initial expected composite rate for the borrower to 80% of the WHO table and 90% for spouses and children. A security load was also included. This was deemed to be somewhat conservative but justifiable, with an expectation that pricing would be lowered once the experience warranted it. After two years of

³⁹ Downward, since the MFI clientele is a select group and therefore expected to be in better health than the average population.

Box 6.1: Pricing without experience in Cambodia

experience had been accumulated, analysis showed that borrower composite mortality rate was approximately 62% of the WHO life tables, 81% for spouses, and 73% for children.

Composite mortality rates can be used to scale or adjust the WHO life tables in order to better adapt them to the pricing and projection purposes at hand, as follows:

- Estimate a composite customer mortality rate from the data. If enough data is available, split it by gender.
- Apply the latest WHO country mortality table to the active customer profile and generate the number of expected deaths D_{M1} for males, and D_{F1} for females in the next 12 months
- Similarly, calculate the expected number of male death D_{M2} and expected number of female deaths D_{F2} using the derived incidence rates derived in Box 6.1.
- Let $AF_M = D_{M2}/D_{M1}$ and $AF_F = D_{F2}/D_{F1}$ represent adjustment factors that will be applied to the male and female WHO mortality rates respectively for use in pricing and financial projections.

Using this approach, the WHO life table has been adjusted by gender at a constant factor across all ages. This can be done with any other mortality table (commercial or country mortality estimates from a government survey). This method may be deemed reasonable if, for example, pricing is for an MFI which tends to select clients that are on average healthier than the rest of the population.

Box 6.2: Adapting WHO table to insured population in Pakistan

Pakistan - 2008

both sexes							
Age	nMx	nqx	lx	ndx	nLx	Tx	ex
<1	0.07572	0.07191	100000	7191	94966	6340072	63.4
1-4	0.00468	0.01852	92809	1719	367110	6245106	67.3
5-9	0.00154	0.00766	91090	697	453707	5877996	64.5
10-14	0.00093	0.00466	90393	421	450911	5424289	60
15-19	0.00127	0.00635	89972	572	448430	4973378	55.3
20-24	0.00188	0.00935	89400	836	444911	4524948	50.6
25-29	0.00214	0.01065	88564	943	440465	4080036	46.1
30-34	0.00249	0.01235	87622	1082	435402	3639572	41.5
35-39	0.00313	0.01554	86539	1345	429335	3204170	37
40-44	0.00422	0.02086	85195	1777	421530	2774835	32.6
45-49	0.00616	0.03035	83418	2532	410759	2353305	28.2
50-54	0.00942	0.04602	80886	3722	395124	1942546	24
55-59	0.0149	0.07184	77164	5543	371961	1547421	20.1
60-64	0.02214	0.10489	71621	7512	339323	1175460	16.4
65-69	0.03527	0.16206	64109	10389	294570	836138	13
70-74	0.05716	0.25006	53719	13433	235014	541568	10.1
75-79	0.09145	0.37218	40286	14994	163946	306554	7.6
80-84	0.14333	0.5276	25292	13344	93102	142608	5.6
85-89	0.21606	0.70142	11948	8381	38789	49507	4.1
90-94	0.31315	0.80732	3567	2880	9197	10717	3
95-99	0.43655	0.86346	687	594	1360	1520	2.2
100+	0.5845	1	94	94	161	161	1.7

For ages above 1, the third column shows the probability of dying during a 5 year period and has to be divided by 5 to obtain an approximation of the annual mortality. As these tables are regularly updated, they show trends in population mortality very well.

Box 6.2: Adapting WHO table to insured population in Pakistan

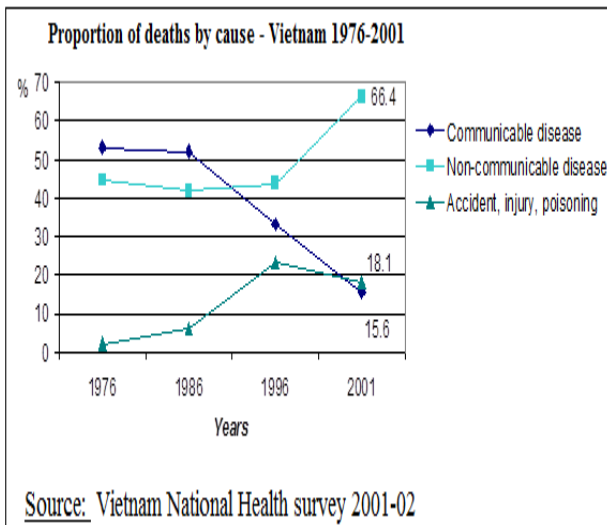
Pakistan Population Mortality per 1,000 per year		age group: 35-39						
		2001	2002	2003	2004	2005	2006	2008
both sexes		3.40	3.34	3.30	3.24	3.45	3.14	3.11
male	50%	3.32	3.26	3.21	3.15	3.33	3.05	3.05
female	50%	3.48	3.43	3.38	3.34	3.58	3.24	3.17
insured sex mix		3.40	3.34	3.30	3.24	3.46	3.15	3.11

Pakistan Population Mortality per 1,000 per year		age group: 25-29						
		2001	2002	2003	2004	2005	2006	2008
both sexes		2.35	2.31	2.26	2.20	2.38	2.13	2.13
male	70%	2.22	2.18	2.17	2.11	2.27	2.05	2.13
female	30%	2.48	2.44	2.37	2.29	2.50	2.21	2.12
insured sex mix		2.30	2.26	2.23	2.16	2.34	2.10	2.13

The second table suggests that if mostly people aged 25 to 29 are insured and if 70% of them can be expected to be men, then a mortality assumption in the range of 2.13 per 1,000 seems adequate.

The WHO mortality data refer to the population in general. The pricing specialist has to carefully consider if the mortality of target market can be expected to be similar or very different from that of the population in general. In a country where half of the population lives under the poverty line, population mortality will be heavily influenced by low income people – but their mortality likely varies depending on their geographical region or occupation or other risk factors. Also, WHO statistics don't have the same level of quality and reliability in all countries.

6.1.2 Accident and TPD insurance



Usually, accident and TPD rates are not available by age and gender since these are very low-incidence events compared to total mortality. The rarer an event, the more data is needed to derive credible incidence rates. One can get some idea of composite accidental death rates. For example, the Vietnam National Health Survey shown (which is a bit dated) could be used to price accidental death benefits by applying WHO life tables to the demographics of a selected target market and then assuming a similar proportion of total resulting expected deaths would be accidental deaths (i.e. as in 2001, 18.1% of all deaths in Vietnam). This is just one approach. If cause of death were available from experience, one could confirm if there is a similar proportion of accidental deaths in the target market.

Accident rates in many countries remain fairly flat in the working population. Therefore, if one had some prior rates for this sector from other sources, these could be used as initial rates for pricing with a fairly high degree of confidence, with the view of collecting experience and additional information after product launch. In this case it is best to price accident related covers on the conservative side to ensure that rates can be lowered rather than raised at a later stage.

The WHO publishes estimates of accidental death rates for all member states, by country, age bracket, cause and gender, as shown below for Kenya in 2008. Without experience to go on, this is an excellent starting point for pricing accidental death benefits. The breakdown is detailed enough so that intentional injuries can be excluded from the pricing if suicide were a policy exclusion.

Table 6.3: WHO accidental death rates for Kenyan males in 2008							
Age bracket		0-14	15-59	60+	0-14	15-59	60+
		Number of accidental deaths			Accidental death rates per 1000		
TOTAL ACCIDENTAL DEATHS		4,450	20,054	2,669	0.534	1.947	3.653
Unintentional injuries		3,917	9,866	1,645	0.470	0.958	2.252
1.	Road traffic accidents	1,342	4,227	763	0.161	0.410	1.044
2.	Poisonings	95	645	43	0.011	0.063	0.059
3.	Falls	120	289	205	0.014	0.028	0.281
4.	Fires	597	174	94	0.072	0.017	0.129
5.	Drowning	429	730	36	0.051	0.071	0.049
6.	Other unintentional injuries	1,333	3,800	504	0.160	0.369	0.690
Intentional injuries		533	10,188	1,023	0.064	0.989	1.401
1.	Self-inflicted injuries	31	1,374	353	0.004	0.133	0.483
2.	Violence	279	6,370	457	0.033	0.618	0.625
3.	War	223	2,444	214	0.027	0.237	0.293
Population		8,339,436	10,302,170	730,535			

It is very difficult to find good data on accidental hospitalization and disabilities. Some government censuses do provide useful information on this, but the authors usually rely on commercial rates as starting points for these types of cover, adjusting these based on their experience for the microinsurance market. Where possible, one should seek to accumulate experience and price by age and gender. In some countries, such as Kenya, one should pay particular attention to the high rate of traffic accidents and note that these may differ significantly between urban and rural dwellers.

6.1.3 Health insurance

In order to adjust the claim frequency to the target population in health insurance, it is often necessary to calculate the frequency of the main types of diseases. Some diseases are highly correlated to gender (all natal care for example) or to age (diarrhoea will be higher for babies). It is thus necessary to estimate the frequency for each main type of disease covered.

<p>Formula (6)</p> <p>Claim frequency = probability (insurance claim due to disease D_1) + ... + probability (insurance claim due to disease D_n)</p> <p>Where probability (insurance claim due to disease D_i) = $P(\text{insurance claim}) \times P(\text{disease } D_i \text{insurance claim})$.</p>
--

Box 6.4: Calculating the probability of hospitalization for malaria

In a slum region of India, experience shows that hospitalization frequency is 2.5%. The hospital has provided the following list of diseases from the previous year's hospitalization:

Broad category	Number of cases observed	Frequency in sample
Malaria	54	18.3%
Dengue	3	1.0%
Fever	45	15.3%
Diarrhea	31	10.5%
Typhoid	21	7.1%
Pneumonia	1	0.3%
Respiratory	12	4.1%
Tuberculosis	3	1.0%
Digestive	6	2.0%
Gastric	6	2.0%
Abdominal	5	1.7%
Appendicitis	5	1.7%
Liver	4	1.4%
Hepatitis	1	0.3%
Kidney	3	1.0%
Calcullus	2	0.7%
Anemia	4	1.4%
Eye	4	1.4%
Skin	1	0.3%
Gynecological	15	5.1%
Diabetes-related	3	1.0%
Hypertension-related	3	1.0%
Cardiac	2	0.7%
Cerebrovascular	2	0.7%
Psychological	2	0.7%
Urinary	2	0.7%
Genital	2	0.7%
Arthritis	2	0.7%
Back	1	0.3%
Joint	1	0.3%
Multiple	1	0.3%
Fracture	6	2.0%
Septicemia	1	0.3%
Other	41	13.9%

The probability of hospitalization for malaria is expected to be $2.5\% * 18.3\% = 0.45\%$.

Note that if the list gave only one month's data, the figures would have to be adjusted to take into consideration the seasonality of risk (especially as the incidence of malaria is higher in the rainy season).

In health microinsurance, premium is often offered as a family package. In this case, individual incidence rates must be translated as policy incidence rates. One cannot simply express the expected family incidence as a multiple of the individual incidence rate; to derive it the family composition must be understood, in particular the number of children and other dependents (such as parents).

Note that processes will strongly impact the incidence rates: without strong claim control, such as proper identification of insured at hospital entrance (for example with biometric technics) and validation of effectiveness of coverage, the incidence rate will probably be higher than expected. Similarly, if a strong referral system is in place, with quality primary health care providers, expected incidence rate will be lower than without these in place.

6.2 Derivation of expected claim amount

If the claim amount is not known beforehand, assumptions for the expected claim amount must be derived. This can be estimated either as a deterministic number or by using a probability distribution (or probability density). Using probability distributions is helpful if one needs to evaluate the effect of implementing maximum benefit levels or deductibles, and it enables better understanding of claims.

Expected claim amount as a deterministic number

The following steps describe how expected claim amount for hospitalization coverage for an upcoming year is derived from data.

Step 1: Gather data

When a health microinsurance programme pays for hospitalization expenses incurred at a well-defined and limited number of hospitals, then finding out what hospitalization expenses the target population has incurred in these particular hospitals in past years is the best starting point (ideally as an annual average for the 15 most frequent treatments, assuming that they are likely to cover 70% or more of all hospitalizations). It is well worth the effort to obtain this data. It is best to get the full hospitalization data rather than just average claim costs.

Step 2: Adjust data for excluded coverage

Next, remove from the list of past hospitalization expenses all cases that the insurance would not cover (for example normal deliveries if the insurance excludes them).

Step 3: Decide on the level of aggregation to be used

If one has data for just 20 treatments, it is preferable to calculate claims amount for a limited number of categories (respiratory, non-communicable, chronic, vector-borne etc.). Some treatments may be very specific from one region to another or very dependent on the age and gender distribution of the target population, and keeping a level of data disaggregation can be useful, especially if a pricing model is used.

Step 4: Evaluate claim volatility

If a lot of data is available, one should evaluate the range of claim amounts for each type of treatment. The average claim amount, standard deviation, variance, maximum claim and minimum claim should be calculated even if a probability distribution is not used. A high variance and standard deviation will show high volatility of claim amounts which suggests a higher security loading and building cost control features into the product (maximum annual benefit, deductibles, etc.).

Step 5: Look at high claim costs

High claim costs should be considered with care. In some cases they should be disregarded if related to a specific event which is not expected to happen again. Frequency associated with this cost should be calculated carefully, as it will highly impact the net premium.

Step 6: Adjust data for product features

If hospitalization information is available, apply the planned deductibles and benefit maximums to retain only the applicable claims costs.

Step 7: Adjust for trends and discounts

Next, adjust the cost of past hospitalizations for medical inflation following the example given for experience pricing in chapter 4. If the data cover several years, estimated medical inflation can be calculated. If bulk purchase discounts were negotiated with the hospitals, apply this next.

Step 8: Apply portfolio breakdown

Unless costs are the same in all hospitals, one should arrive at a set of expected hospitalization costs for next year for each hospital. Unless the premium will differentiate by hospital (for example people in one valley will only be insured for treatment in the local hospital), one next has to make estimations of the flow of insured patients to the different hospitals. Combining all information, a weighted average that tells how much an insured treatment will cost on average next year can be calculated.

Circumstances will dictate a great variety of different approaches to estimate the future expected claim amount requiring resourcefulness in approaching this task.

Using an analytical distribution to model claims

As mentioned in section 4.3.2, it may be necessary to use a probability distribution to model expected cost, especially if one needs to apply deductibles or ceiling in the pricing.

Whenever an analytical distribution (exponential, lognormal etc.) will be used, its parameters have to be determined from the raw data. The best analytical distribution to model the expected claim amount is also best determined in view of the raw data.

Although special software (e.g. plugins for Excel) can be bought for this task, considerable mathematical expertise is required, both for correctly handling the software and for using the results. Fortunately this is not frequently required in microinsurance.

In cases where it is not enough to have one number to represent the average of all claims expected (if one needs to model the effect of claim limits on average cost, for example), claims amounts may need to be

modelled with analytical distributions. Calculating the expected average claims cost using analytical distributions requires some mathematical understanding, but can be done in spreadsheets for some distributions. The more difficult question is which of the many different analytical probability distributions to use. If suitable comparable past claims experience is available, there are mathematical methods and specialized software for the task of “curve-fitting”, that is, finding the analytical distribution that best represents the observed data and determining its parameters. Analytical probability distributions are usually described by a formula that has one or more parameters, such as the average, the standard deviation (how much random events may differ from the average), the skewness (a measure of asymmetry of the distribution, which is the likelihood of random events to be far above or below the average) and so on.

One of the most straightforward probability distribution functions is the exponential distribution⁴⁰, but it is generally considered less appropriate for insurance if there is the possibility of high claims since it tends to underestimate those. Probability distribution functions more commonly used in insurance are the Pareto Distribution⁴¹ and the Lognormal Distribution⁴². The well-known, bell-shaped Normal Distribution, by contrast, is not suitable to model insurance claims sizes, because it makes very small claims as likely as very large ones (although there are no negative insurance claims).

It should be remembered however that applying sophisticated mathematics to unreliable data (and data in microinsurance is often unreliable) can give a false sense of accuracy and security. It is important to apply good judgment, based on experience and appropriate data analysis to set assumptions, whether these assumptions are based on fixed point estimates or probability distributions. The quality of the underlying data ultimately determines the accuracy of the assumptions.

6.3 Adjusting for trends

Whenever insurance claims amount and or frequency are affected by an underlying trend such as medical inflation in the case of health insurance (which could itself be driven by exchange rate movements when drugs have to be imported), or general inflation in the case of car insurance, it is necessary to project the effect of such trends on future claims.

For example, suppose a health insurance scheme had a total amount of 1,000,000 in claims in 2011. It is anticipated that cost of health care will go up by an average of 12% and that this will also apply to the services and providers covered under the insurance. If everything else remains unchanged (same insured persons, same cover and product features) claims are likely to be $1.12 * 1,000,000 = 1,120,000$ in 2012 and $1.12 * 1.12 * 1,000,000 = 1,254,400$ in 2013.

When setting assumptions, the time horizon over which the risk premium will be valid and the trends that affect claims frequency and severity must be considered. For example, the initial claims frequency for a health microinsurance scheme may be low due to low awareness of the claims procedure by the insured population. Sometime later, it may rise sharply as the insured become better educated and gain the confidence to access healthcare. In this case, if the assumption is reviewed on the basis of first observations, the risk premium will not be sufficient to cover the actual outlay some time later.

In order to ensure that the data collected will remain valid during the first term(s) of the policy, the pricing specialist has to ensure that no major changes are taking place within the target population or

⁴⁰ http://en.wikipedia.org/wiki/Exponential_distribution

⁴¹ http://en.wikipedia.org/wiki/Pareto_distribution

⁴² http://en.wikipedia.org/wiki/Lognormal_distribution

economic context. Attempts should be made to detect any trends in the data collected. In short, it should be determined if future claims experience is likely to vary significantly from that observed in the data.

As far as health is concerned, countries with an economy in transition may experience changes in the diseases observed thanks to new treatments (positive impact) or due to change in lifestyles (positive or negative impact). In India, for example, the number of people with diabetes or cardiac issues is expected to increase considerably during the 21st century as diets and job types change.

There is also a need to ensure that the data it is not a snapshot of a particular period which is not wholly representative of reality. Some risks, like health, are seasonal, and relying on information from the rainy season to assess claim frequency for an upcoming year may lead to an overestimation annual rate of malaria, for example.

Finally, it is recommended to question experts (on health, climate) in order to identify and assess trends which could impact both frequency and claim amounts.

6.4 Adjusting for portfolio composition

Whenever data describes a population that differs significantly from the anticipated insured population with respect to substantial risk factors, the data will require adjustments in setting the pricing assumptions. For example: a public source may say that the average mortality of a country is 1 per 1,000 per year; but that figure usually refers to the general population, which includes people from age 0 to age 100+ (composition will vary for each country). If a life microinsurance product is to be offered to clients of a microfinance institution, these will like be aged in the range of 15-60 (depending on the MFI). This age group has a different average mortality than the whole population. If this MFI only serves women, their average mortality rate will differ significantly from a population composed of both sexes even if the age distribution is the same.

Portfolio composition also needs to be considered when using insurance claims experience from one MFI to price a similar product for a similar MFI that may have a different age/sex client distribution. Of course it also has to be addressed if such an MFI changes the age limits for its clients, or if it applies different age limits for insurance than for loans or deposits.

For example, the claims experience from a commercial insurance company's health business can provide useful insights for a health microinsurance product with comparable coverage. But in addition to socioeconomic differences, the population in the area chosen to pilot the product can be exposed to very different morbidity factors (environmental pollution, dietary habits, sanitation, parasites, water-borne and other communicable diseases), resulting in very different insurance utilization.

6.5 Adjust for the effect of insurance on behaviour

Adjustments must also be made whenever the insured population's behaviour is expected to differ significantly from the population described by the data, because of the simple fact that one is insured and the other is not, either due to potential underwriting effect, adverse selection or moral hazard.

When insurance is sold individually and the individual's insurability is assessed (individual underwriting), unhealthy people are often denied insurance and the better health of those who get insurance can still be seen many years later; this reduces mortality rate or health incidence rate of the insured population. In microinsurance, even if proper underwriting is not common, when insurance is sold to groups, it may be assumed that members of the groups have been somehow selected since very

unhealthy individuals are normally not accepted as group members (if microinsurance is offered to employees of a common employer, people unfit for work are not included the group; if insurance is offered to members of a borrowing group in microfinance, people in very bad health would not often be accepted as borrowers, etc.). Similar mechanisms often apply for productive cooperatives and other relevant groups and are termed as an underwriting effect. Particular judgment is needed to properly reflect its effect on pricing.

There is also a reverse effect, called adverse selection: people who can expect to make above average use of an insurance product have a stronger motivation to buy it (which is why suicide is usually excluded), and unless defensive mechanisms are put in place, they will buy it in greater numbers than people who feel immune to the insured risks, because they are healthy, live healthily, avoid risky behaviour, and in general use risk mitigating measures.

Another aspect of this phenomenon is called moral hazard. While insured populations may be of lower inherent risk, their behaviour may be different from that of uninsured persons. Insured may possibly be less motivated to avoid adverse events that lead to insurance claims, or to contain them. For example, their efforts to fight the fire on an insured house may be less vigorous than on an uninsured house, and the efforts to protect and foster insured crops may be less vigorous than if the crop was not insured.

Yet another face of this phenomenon in health insurance is the aspect of treatment delay or substitution. Very often health microinsurance covers in-patient treatment only, while out-patient treatment continues to be an out of pocket expense. In such cases, there is often a tendency to hospitalize people for ailments that could also be treated through out-patient services; for example prescribing intravenous rehydration (much more expensive) instead of oral rehydration for diarrhoea cases. Moreover, medical conditions get worse if not treated early, but prevention and early treatment are usually out-patient services and not normally insured, hence they require out of pocket payment from the individual. This is not an incentive to seek health care at the most convenient stage, especially if insurance will pay once the condition requires hospitalization.

In contrast to conventional insurance, inclusion is often a guiding principle of a microinsurance venture. Microinsurance programmes often have social goals which may conflict with more restricted policy conditions. There are also costs associated with underwriting, which also explain why much less underwriting is carried out in microinsurance. Every traditional insurer has to decide for every product on a degree of underwriting that balances the cost and the financial benefits of lower claims, and in principle this is also the case for microinsurance. But unlike conventional insurance enterprises, microinsurance providers often have the explicit objective of reaching out to as many people as possible, and, in particular, to the most vulnerable and the least likely to be served by conventional insurance. This can create a dilemma for the pricing specialist who has to explain to the other stakeholders that inclusion may come at the cost of higher claims, and that offering generous insurance cover with few exclusions to a very inclusive group (ignoring usual age limits, for example) needs to be reflected in the pricing. This may well make the insurance unaffordable for precisely this target group unless their premium is subsidized. There is no general solution to this dilemma. The desire for inclusivity has to be balanced with the need for sustainability. Sometimes an insurer may take the deliberate decision to cross-subsidize microinsurance from profitable insurance sold to more affluent groups, but there are limits to the extent of this, especially for publicly traded insurers and situations where the microinsurance volume grows strongly.

Adjustment must be made whenever the financial loss suffered as a result of a fortuitous event can be expected to increase once insurance provides compensation for it (whether or not due to moral hazard). For example, occasionally health care providers are tempted to charge more to insured persons because they expect less control and resistance from a distant insurance company, or because the insurance

company had negotiated discounted fees that the provider feels are unsustainable; or both. Even when cost and protocols for treatment have been agreed on, providers may charge more by mis-stating diagnoses. Reporting every case of malaria as complicated, for example, as has been experienced in an African country where large scale state supported health insurance was introduced.

6.6 Adjust for different products features and processes

Whenever the data used for pricing was generated from insurance experience where coverage features differed significantly from the product being priced, or with different operational processes, adjustments should be made.

For example, even in a hypothetical case where all else were equal, the claims experience (both incidence and average claim amounts) of a hospitalization insurance without a deductible will differ substantially from that of the same product with a deductible, and the degree of difference will be related, but not proportional to, to the amount of the deductible. While deductibles are a common feature in conventional health insurance, they are often not incorporated in microinsurance to avoid confusing those clients with little insurance literacy. This implies that the claims experience of the commercial product cannot be used without suitable modification (that is, quantification of the impact of the deductible on claims), even ignoring the fact that the products would usually target different populations and so on. The reader may want to review Box 4.2 in section 4.3.2 for an example.

Adjustments should also be made whenever the data used for pricing was generated from insurance experience that differed significantly with respect to distribution, servicing, or claim control mechanisms. For example, the usual absence of individual underwriting in microinsurance exposes an otherwise identical product to different adverse selection. This is often met with waiting periods or exclusions, but their impact cannot be accurately predicted. Another example is the way insurance is sold, and more importantly, explained. People only barely aware of their insurance entitlements are likely to make less than anticipated claims, while people misguided about their insurance cover can also display unforeseen claims behaviour. For example, many may claim for uninsured events which may go undetected because of less than prudent claims management.

Box 6.5: On the impact of operational processes on claim frequency

In India, two different programmes were operating in a similar area, offering similar health insurance products: coverage of in-patient care at empanelled hospitals.

In the first programme, MOUs were signed with all empanelled hospitals, and a medical officer was tasked to control the health facility bills, ensure appropriate protocols and tariffs were used, and verify cases of over prescription.

In the second programme, though MOUs were in place, there were no processes to control hospitals' compliance with the agreement.

As a result, the risk premium for the second programme was seven times higher than in the first programme, showing how processes can have huge impact on pricing

Source: Author's own experience

For example: the protocols followed by healthcare providers greatly impact the costs for patients (and thus of insurance programmes). Dehydration, for example, can be treated with an intravenous drip or with oral rehydration salts (ORS), but the latter are much cheaper and just as efficient. The existence of a contract between the insurer and the health care facilities will impact the claim frequency. Not only is having a contract important, but also making sure its terms and conditions are fulfilled is crucial.

Pricing and management processes are highly correlated. Ensuring proper fraud controls is one major way to reduce claim incidence, especially for health insurance.

6.7 Apply a safety margin to the parameter

Instead of or in addition to the security margin and margin of error discussed in Chapter 3, one may be able to justify a safety margin applied to some or all of the key pricing parameters to take into consideration that unforeseen errors could have been made when transforming scarce information into pricing assumptions, or that external changes may threaten even perfect foresight. As there are no general rules for what would be appropriate, judgment based on the reliability of the raw data and the complexity of the transformation process is needed. Debate with other stakeholders has to be anticipated given that any margin increases the premium rate. Transparently explaining the pricing decisions in plain language helps to achieve “buy-in” (refer to section 4.3.3 for more on safety margins).

6.8 If pricing is outsourced

The external consultants should know what the key parameters for the pricing formula are, and should be experienced in setting appropriate assumptions for them. To do a good job at this, the consultant will need to know all available relevant data and understand it, and it is the pricing specialist’s job to make sure he does.

The pricing specialist should be able to discuss the assumptions with the consultant, and validate that they are sensible in view of all that is known – especially in respect of internal aspects such as processes. External consultants’ knowledge of these will never match the inside knowledge of the pricing specialist. It is this familiarity with the assumptions that will enable the pricing specialist to conduct appropriate monitoring after the product is launched.

7. Validating the net premium

Key messages:

Once input parameters are set, one should question and validate both the input data and the final net premium, before moving to the next steps of the pricing cycle.

Sensitivity checks are necessary to identify the impact of variation in assumptions on the net premium. Parameters impacting the net premium more significantly should be identified and carefully monitored after the product has been launched.

7.1 Checking for reasonability

Verify reasonability of assumptions

Once the main parameters are defined, the pricing specialist should answer the following questions:

- Do assumptions appear reasonable?
- Do the assumptions appear consistent with internal experience?
- Are there other sources of similar parameters to which the derived parameters can be compared?
- What is the feedback of partners and peers?

If input assumptions seem reasonable, net premium should be calculated using the formulas described in previous chapters. The final net premium amount should also be questioned and validated before adding the security margin and other loadings.

Verify reasonability of the net premium

The pricing specialist and product development team should meet and compare the net premium amount with the following items (for which information should have been collected as described in section 5.2.4):

- Net premiums of other similar products being offered;
- Expected aggregate claims should be estimated over the policy term;
- Willingness and ability to pay (if the net premium is already too high, revising the product features is necessary);
- Final cost to client including transportation to the point of sale and servicing, and including co-payments if any;
- Alternative informal risk protection or coping practices.

The team should bear in mind that more loadings are still required. The net premium can therefore only serve as a first indication; if it is already higher than acceptable, there is no point in moving forward to quantify the necessary loadings. If it is very unlikely that the desired number of persons will buy the insurance at this price then the team must reconsider the premium and the product design.

7.2 Sensitivity checks

Sensitivity testing is used to evaluate the effect that variations from expected assumptions could have on the financial results. Observed sensitivity can be helpful with setting appropriate safety margins, implementing appropriate claims controls for certain critical factors, and identifying areas that require careful monitoring.

The following example for a hospital cash insurance product in Africa illustrates the use of sensitivity testing. The three critical pricing assumptions in this example are the incidence rate, the average length of hospital stay, and the total number of lives insured. Variations in the exchange rate also impact on the financial results, although this is not illustrated.

The best estimate assumptions used to set the risk premium are:

- Incidence rate: 6%
- Average length of hospital stay: 4 days
- Expected number of lives insured: 25,000

The following three tables illustrate the projected underwriting results for different combinations and variations in the underlying assumptions. The projected underwriting result is defined as the projected total net premium received less the projected total paid claims for a one year period.⁴³ Note that the best estimate parameters result in an underwriting result of zero since only the risk premium is being tested which does not include any margins for security, expenses or profits.

total number of lives insured: 25'000						
UNDERWRITING RESULT in USD	incidence	average length of hospitalisation				
		2	3	4	5	6
	4%	30'349	22'762	15'175	7'587	0
	6%	22'762	11'381	0	-11'381	-22'762
	8%	15'175	0	-15'175	-30'349	-45'524
	11%	3'794	-17'071	-37'936	-58'801	-79'666
	15%	-11'381	-39'833	-68'285	-96'737	-125'190

total number of lives insured: 15'000						
UNDERWRITING RESULT in USD	incidence	average length of hospitalisation				
		2	3	4	5	6
	4%	18'209	13'657	9'105	4'552	0
	6%	13'657	6'829	0	-6'829	-13'657
	8%	9'105	0	-9'105	-18'209	-27'314
	11%	2'276	-10'243	-22'762	-35'281	-47'800
	15%	-6'829	-23'900	-40'971	-58'042	-75'114

⁴³ Note that this is not precisely the definition that would be used for financial reporting, which requires the determination of earned premiums and incurred claims. However, for this type of analysis, the distinction is not required: we are looking at projected results, NOT actual results, so we can assume that all premium is earned as received, and that all claims are paid as incurred, without any reporting delays.

total number of lives insured: 36'000 (maximum)						
UNDERWRITING RESULT in USD	average length of hospitalisation					
incidence	2	3	4	5	6	
4%	43'703	32'777	21'851	10'926	0	
6%	32'777	16'388	0	-16'388	-32'777	
8%	21'851	0	-21'851	-43'703	-65'554	
11%	5'463	-24'583	-54'628	-84'674	-114'719	
15%	-16'388	-57'360	-98'331	-139'302	-180'273	

Positive numbers indicate underwriting profits, and negative numbers indicate underwriting losses. Numbers in red indicate where a “pain threshold” of US\$ 50,000 is exceeded, i.e. a level of underwriting losses that the insurer does not wish or is unable to cover.

What can be concluded from this analysis? Firstly, the higher the number of lives covered, the higher the potential losses. This could help the programme managers decide to test the product on a pilot basis until they have further experience data with which to refine their assumptions.

Secondly, the underwriting results are linear with respect to the average length of stay which is exactly what is expected for a hospital cash product with a fixed benefit per day and no deductible or waiting period. Under-estimation of this parameter could materially affect the financial results, especially if the incidence rate is also underestimated. This suggests that an appropriate safety margin should be added to the best estimate assumption to minimize the probability of excessive losses. It also indicates that length of stay should be monitored closely as the actual experience develops, and that it could be worth implementing cost control measures to help to reduce hospital stays. Depending on the cost, of course, a claims administrator checking on patients as soon as they are admitted and ensuring they have speedy access to treatment could help reduce overall claims costs. Other options to minimize the risk of large losses could include setting a maximum number of covered days, or purchasing reinsurance for aggregate claims that exceed a certain retention limit.

The underwriting result is also significantly affected by the incidence rate, again in a linear fashion. Notably, a 2% change in the incidence rate has a greater effect on the underwriting results than a change in the length of hospitalization by 1 day. It might therefore be more critical to emphasize measures that control incidence rather than focusing on measures that control the length of stay. This could include excluding certain conditions from coverage or implementing a waiting period deductible; for example, only paying for hospitalizations that exceed 1 or 2 days is one way of reducing the insured incidence rate.

At this point, one also needs to consider the probability of these variations, in order to determine whether or not a security margin is necessary and how much of a margin is needed. For example, how reliable and extensive was the data used to calculate the incidence rate? If the data quality was good, and the population sample used was both large enough and comparable to the target population, then a smaller safety margin is needed since the expected volatility will be low. If it is reasonably probable that incidence will reach 6% at most, and average length of stay will reach 5 days at most, then a security margin should be calculated so that the projected underwriting result for that set of parameters is zero.

It is important to test the sensitivity of the financial results to all of the implicit assumptions that have gone into the premium calculation. For example, the incidence assumption might be based on a number of underlying factors, including assumptions regarding the age and gender of the target insured group. What affect will it have on the financial results if the actual composition of the insured group is different from the underlying assumptions? For example, using the above illustration, if more women are insured than is

accounted for in the incidence rate assumption, will this increase or decrease the overall incidence rate? Does it have an effect on the length of stay assumption as well? Significant variability due to demographic assumptions may point to a need to collect and monitor insured customer data at that level (which is advisable anyway). Conversely, for a different product, such as property insurance, the claims experience may not vary at all based on the age or gender of the insured, and it may be more important to collect and monitor a different set of data.

7.3 Revisit product design if necessary

As described above, pricing can be viewed as a cycle that in itself is part of the product development and financial projections cycles. Based on the product definition and projected financial outcomes, an appropriate price is calculated, and when that is too far from the target price (that is, in relation to information on the ability and willingness to pay of the target market) then the product design needs to be revised to reflect the desired premium. For example, measures such as reducing the sum insured, introducing deductibles or co-payments, modifying the scope of cover, tightening eligibility criteria, and adding exclusions will reduce the premium if everything else remains constant. However, it is not wise to assume that everything else will remain constant: for example, different eligibility criteria (such as the inclusion or exclusion of family members) or a deductible will impact the risk profile of the market segments that will find the insurance attractive. Quantifying this impact may again require changes in the product or the premium, and the cycle starts again. So in most cases, product definition, product refinement, revision of financial projections, and pricing are iterative.

Similarly to development of new products for a conventional insurer (which does not happen frequently in mature markets), the first step is to bring together the marketing department (who see a need or demand, or are familiar with the results of market research that has been conducted), operations department (who know what can be done and how) and the pricing specialist. They will each come with some homework done, and ideally the pricing specialist will be ready to address unrealistic expectations. For example, marketing tends to expect too much of a product for a given price. If the team is not very experienced, the actuary will explain, for example, that insurance that pays upon death from any cause is more expensive than accidental death insurance, that policies with cash back features (return of premium or some other “no-claims-bonus”) will have higher premiums than the corresponding policies without that feature, or that, in the absence of individual underwriting, mandatory policies are likely to attract much less adverse selection than voluntary policies. Such initial discussions will define the desired product in increasing detail, which in turn will allow the pricing specialist to give increasingly specific estimates of the likely premium levels.

If initial premium estimates are outside the desired range, the product design will have to be reviewed accordingly (by addressing any one or several of the features listed above), and the actuary will provide the estimated premium for the revised product. This process iterates until all parties are satisfied.

A good exercise at this point would also be to revisit the product description checklist from section 3.4. Have all relevant aspects of the product been taken into consideration when calculating the risk premium?

7.4 If pricing is outsourced

The internal pricing specialist should validate the input parameters and the net premium based on the company’s existing knowledge. If there is discomfort with the assumptions made by external consultants, it must be discussed until there is agreement.

The external consultant should provide the results of sensitivity checks and recommend which of the parameters have to be monitored closely.

8. Setting the Gross Premium

Key messages:

Setting the gross premium consists of solving the following equation: All cash flows in = all cash flows out.

Calculating the gross premium requires linking projections of costs with projections of business volume.

Depending on the product and setup, it is probable that the microinsurance provider will lose money initially, and will need to find funding to absorb these as well cover initial expenses.

Expense ratios in microinsurance may be higher (as a percentage of premium) than for traditional insurance.

In microinsurance specifically there needs to be a balance between a “reasonable” expense margin and the costs of reaching the target population, which may be high, especially in the beginning.

Microinsurance is mostly a high volume/low margin business model.

Pricing assumptions should correspond to business plan assumptions.

8.1 Definition and gross premium calculation process

The gross premium is the total premium which will be charged to the insurance purchaser. On top of the net premium, which should cover the future cost of claims, the gross premium should enable all stakeholders involved in the insurance distribution and administration to cover their cost and make profits at levels that depend on their objectives.

There is always a cost associated with providing and servicing insurance: processing of enrolments (i.e. collecting data and providing insurance certificates); data encoding and management; answering purchasers’ questions; training intermediaries; reporting to shareholders and regulators; assessing claims; calculating and managing reserve funds; etc. These tasks require resources which come at a cost, and unless there is reliable permanent outside subsidy, this cost has to be covered from the insurance premiums. The net premium only covers (with a high probability) the anticipated claims, not even including the process of claims management. Therefore, expense loading needs to be incorporated in the premium, following a simple rule: all the expenses incurred in providing microinsurance and profits desired have to be paid from what is left over of the premium after payment of all claims.⁴⁴ As discussed in section 2.2, investment income may or may not be a significant additional income.

The basic equation is gross premium = net premium + expenses + profit margins.

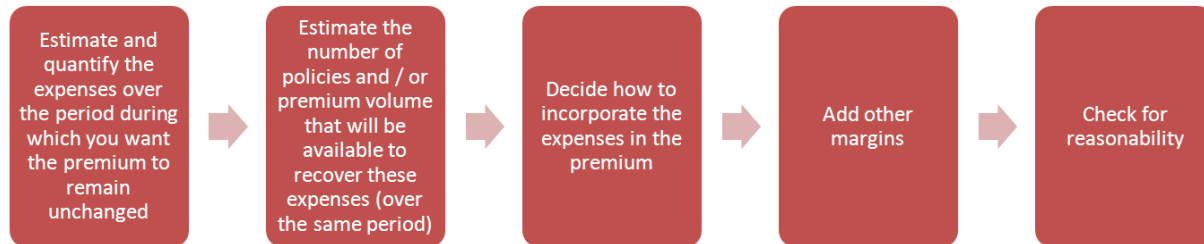
The most important questions to be answered in order to calculate the gross premium are:

- What expenses will be incurred?

⁴⁴ Given the different timing of premiums and claims, reserves have to be established to take account of the delay between premium and claims payments, but in the long run they don’t matter and hence will be ignored in this section.

- What is the timing of each projected expense component?
- How should expenses be incorporated into the premium?
- How will inflation affect the various expense components?

The process for setting the gross premium is the following:



8.2 Expense and other loadings

The following expenses should be included in the gross premium:

- Expenses
 - ✓ Start up and development costs;
 - ✓ Marketing and distribution;
 - ✓ Operating costs (mostly back office), some fixed and some variable
- Other expense loadings that must be included
 - ✓ Net cost of reinsurance
 - ✓ Cost of capital
 - ✓ Taxes

Price inflation must be incorporated for future years if the gross premium is being developed for more than one year.

8.2.1 Start Up and Development Costs

Starting a new insurance programme requires investing in activities and material which will enable the programme to run once the product is launched. In microinsurance especially, those costs may be high as it often requires setting up new processes and using new sales force structures, whereas in conventional insurance traditional processes and material already in place can be used.

For example, start-up costs could include:

- Product development cost (market research, consultants' fees, travel, accommodation, meeting costs);
- Recruitment costs;
- Legal and establishment costs (for example, fees and lawyers' expenses incurred to obtain insurance agency license or to establish a new company);
- Hardware (such as computers, telephones, point of sale devices, office furniture and equipment, cars etc.);
- Software development or purchase.

These costs are often addressed by grants and similar upfront project subsidies. They may not cover everything, and some expenses are of a recurring nature; for example, hardware will need to be replaced over time, and recruitment costs can be persistent when staff fluctuation is high. So even with initial

donor funding for many of these, it is important to quantify them, put them in relation to available funding, and consider future sources to cover them.

Marketing and distribution

Challenges to microinsurance success include reaching a population which may be distant from insurance distribution branches or have limited knowledge of insurance. Being successful in microinsurance is highly correlated with finding an efficient and cost effective distribution methodology.

There are many options tested by microinsurers: partner with an external institution which will distribute products (a MFI, a cooperative etc.); individual sales agents; using technology (cellphones, biometric registration etc.); retailing through rural banks; and others. The distribution approach will have a high impact on the level of expenses to be added to the net premium.

When distribution is outsourced to a partner, the most common scenario is to negotiate a commission to be taken from the gross premium.⁴⁵ The pricing specialist needs to be very clear on the activities the distribution partner will be responsible for, and which will have to be financed by the company since commissions must be commensurate to the distributor's costs and profit objective.

The following list includes the main costs associated with distribution and marketing:

- Commission to distributors and other intermediaries
- Incentives to sales force
- Outsourced⁴⁶ training of sales force and other intermediaries⁴⁷
- Outsourced development of training materials⁴⁸
- Outsourced production and transport of training materials
- Outsourced development of sales help/marketing materials
- Outsourced production/transport of sales help/marketing materials
- Broadcasting or other mass media delivery expenses
- Outsourced impact assessment cost
- Outsourced development and production of customer information material
- Outsourced development and production of enrolment data capture material⁴⁹
- On-going cost of enrolment technology⁵⁰
- Outsourced enrolment data capture
- Capital investment for enrolment⁵¹
- Outsourced development, production, and transport of insurance certificate⁵²
- Capital investment for production of insurance certificates⁵³
- Premium collection cost
- Outsourced review and improvement of materials⁵⁴

⁴⁵ Note that commissions are usually a percentage of the gross premium and not of the net premium

⁴⁶ To the extent that this and subsequent tasks are performed by permanently employed staff, the corresponding cost is included in their salaries

⁴⁷ Consider that retraining is often necessary because of staff fluctuation

⁴⁸ Including any corresponding cost incurred with focus group discussions or other knowledge gathering exercise

⁴⁹ For example enrolment paper forms or software for enrolment done with computers or hand held devices; includes premium receipt confirmation

⁵⁰ For example monthly or per transaction fees for enrolment support software

⁵¹ For example purchase of hand held data capture devices

⁵² Such as (smart / biometric) insurance cards

⁵³ For example card printers or devices to load information on smartcards

⁵⁴ Same as 9

Take into consideration that these expenses are neither entirely variable (directly proportional to the number of policies sold) nor entirely fixed (independent of the number of policies sold). Costs for training sales staff at one sales outlet will not vary with the number of policies sold. Similarly, costs for some marketing materials such as banners may not vary either, but costs of other materials, such as product information brochures will be proportional to the sales volume. Costs of training sales staff (and for banners, etc.) will increase with every sales outlet.

8.2.2 Operating costs (mostly back office)

- Staff cost: salaries, benefits, incentives and rewards
- Office expenses: rent, maintenance/janitorial, electricity, communication, furniture and equipment (purchase and depreciation), insurance
- Travel and transportation: travel, accommodation, entertainment, vehicle costs (rent, maintenance, depreciation, fuel)
- IT: hardware purchase and depreciation, software updates, maintenance, license fees
- Fees: Legal and professional charges, bank fees, audit fees, directors' fees
- Other outsourced services (HR, accounting etc.)

Office and staff costs may appear to be fixed and not proportional to the volume of business transacted. However, that is not strictly true; although they are not immediately responsive to volume change (i.e. inelastic), in the long run they are driven by volumes. For example, if a person can handle X claims per year, then the cost of that person's salary, workplace etc. will not change as the number of claims grows from 50%X to 80%X to 100%X, but as the number of claims reaches the limit of that person's capacity, a second person will have to be hired and the corresponding cost will jump up. Gains in efficiency slow that process but cannot stop it.

Not all of the costs listed above may need to be recovered through premium income; for example, when a microinsurance venture shares office space, communication, infrastructure and so on with a larger enterprise that does not charge for its use (although this is rarely the case). This justifies looking at the cost components in detail, and being clear upfront about which costs will be borne by whom.

Note on fixed and variable costs

There is some overlap between all the costs mentioned above; for example, claims handling expenses will be made up to a large extent by salaries of claims handling staff, so will be included already. Similarly, per policy administrative expenses will be made up by administrative staff salaries, and IT and office cost etc. (and is divided by the number of policies).

In general when looking at expenses for pricing, the pricing specialist should consider both fixed administrative costs (such as salaries) and variable costs. For example, printing policies is a per policy cost and is variable depending on the number of policies. Issuing policies can have other variable costs, such as postage or cost of delivery. Transaction costs, such as banking fees, are generally per transaction so are variable. Similarly, claims adjudication costs often have both a fixed and variable component – fixed costs for staff, but variable costs for documentation, claim verification/audits, delivery, etc.

Another issue is that the underlying expense might be variable, but assumed to be fixed for the purposes of including it in the premium (or the other way around). The actual cost and the formula are two different things (for example, transforming fixed office expenses into per policy loadings).

Some ambiguity and overlap in this exercise has an upside because it forces one to consider different types of expenses and how they fit into the whole picture.

8.2.3 Net cost of reinsurance

When a reinsurance treaty is in place, the net cost of reinsurance defined as the difference between the cost of reinsurance and the benefits received, should be included in the gross premium as an expense. Depending on the type of treaty signed, and if expenses are not charged by the reinsurers (as microinsurance would still represent a minimum part of the reinsurer activity), this amount may be negligible.

8.2.4 Cost of capital

Insurers are by law required to hold reasonably large amounts of capital in safe instruments to allow them to honour their obligations to pay claims, even when substantially more or larger claims than projected occur. This is one of the reasons why, in many countries, only insurance companies are allowed to provide risk transfer, and informal risk management programs occasionally offered by MFIs or funeral parlours operate outside the law.

Holding this regulatory capital comes at a cost since investors who provide it cannot spend or invest it elsewhere, so they demand a return on capital (opportunity cost). And as investing their money in insurance capital is often more risky than other forms of investments (after all, the money can be wiped out in disastrous years) they demand a higher rate of return than from safer investments. Therefore, while the deposited capital does earn some interest, the additional return expected by investors has to be generated from other sources, and the insurance activity is the only other possible source. Insurance pricing thus has to include an expense loading to fund the insurer's cost of capital. For private insurers, the rules for determining the capital it is required to hold, differs from country to country, but generally are in some way related to the amount and type of insurance carried, type of assets held (investments made), risk-based capital calculations, etc.

8.2.5 Surplus and equity build up

Self-managed microinsurance programs, which may not be subject to the same regulation as insurance companies with respect to capital requirements still need to secure their insured customers (these could also be the member-owners in the case of a mutual) by constituting equity or surplus to guarantee their solvency. Surplus and equity build up loading is used to generate profit, to be set aside either in a contingency reserve or in inappropriate surplus account or member equity account, to be accessed if the insurance program's reserves are inadequate.

8.2.6 Profit margin

So far all the components of the premium discussed are intended to cover anticipated expenses. *On average*, a perfectly priced product would result in zero net income without a profit load. Insurance providers generally do have to generate a profit to satisfy their investors and or to finance future growth and this has to come from premium revenue and investment activities. A loading for profit is therefore needed.

The appropriate profit margins for microinsurance are debatable as the sector has both social and business objectives. Internal discussion on the appropriate level of profit margin should take place at the product development, pricing, and business planning stages, taking into consideration the following:

- Does the microinsurance program have a primary social objective? Is it funded by external donors?
- Is there a reputation risk linked to level of profits generated by the microinsurance program? The image of an insurer always suffers when accused of unduly overcharging its clients, but when these clients live below the poverty line the effect can be detrimental. Microinsurance tends to be under greater observation than conventional insurance and sustained low loss ratios are likely to result in public criticism of unduly high profits.
- How will future investments in growth and expansion be funded? If investments need to be funded through premiums, then some profits need to be generated from the activity.
- As there a plan to increase risk-retention limits in the future? If so, in the absence of direct capital investment, this will require additional surplus buildup from profits.

A view held by some is that in serving the low income market, absolute profits should be based on high volume rather than high profit margins.

8.3 How to integrate expenses in the gross premium

8.3.1 The formula(s)

Expenses are generally calculated as a percentage of the gross premium. Indeed, gross premium is the number which is easily accessible and recorded in the account books, and calculating expenses based on gross premium is simple. It also facilitates comparison to the company's overall expense ratio.⁵⁵

The following formula should be used for short term products:

<p>Formula (7a)</p> <p>Gross premium = (net premium) divided by (1- expense loading)</p>

As discussed in the previous section, some expenses are fixed, and formula (7b) accounts for those:

<p>Formula (7b)</p> <p>Gross Premium = (net premium) divided by (1- variable expense loading) + fixed expenses</p>

If the decision is taken to include a profit loading of X%, cost of capital and to use reinsurance, then the formula to include it in the premium is:

<p>Formula (7c)</p> <p>Gross premium = Net premium divided by (1 - expense loading - profit loading- net cost of reinsurance)</p>
--

The only other loading that may need to be applied, depending on local tax rules, is a loading for taxes. If the insurance company has to pay Y% of every insurance premium collected to the local tax authorities, then that expense has to be incorporated in the premium:

<p>Formula (7d)</p> <p>Gross premium = Net premium divided by (1 - expense loading - profit loading – net cost of reinsurance -cost of capital - premium tax - any other loading)</p>
--

⁵⁵ Expense ratio is the total incurred expenses divided by the total gross premium (earned).

Different countries have different approaches to taxing insurance premiums, so Formula (7d) is not universally applicable, but gives an example of the most common approach.

The resulting gross premium has to be compared to the desired ranges of willingness and ability to pay. Even if the net premium was acceptable, the gross premium may be too high, thus requiring another iteration of product revision. Before initiating an iteration at this stage, less costly ways to deliver and/or administer the product should be explored.

Long term insurance

The formulas above are only suitable for short term products. Incorporating expenses into longer term products such as whole life, n-year term, and n-year endowment requires much more complex formulas which will not be discussed here. For example, expense loading of the monthly net premium for a 10-year endowment product requires a formula with hundreds of terms in both in the numerator and denominator.

This concludes the calculation of the premium. Further loadings are not usually necessary.

8.3.2 What expenses should be recovered through the premium?

Capital investment recovery need not be included in the pricing if there are grants or cross-subsidies for this. Often they are of an order that cannot be recovered from the insured through the premium anyway unless a scheme starts with really large numbers of insured. For example, recovering the cost of a vehicle from premium may make the insurance unaffordable if the programme is very small.

Where an entity has other activities as well as its microinsurance business, there will be overhead expenses that are not exclusively related to microinsurance. Consider an insurance company that also services wealthier clients. This company has accounting and human resource departments, holds capital for regulatory purposes and will maintain communications systems. All of these resources are also used to some extent by its microinsurance operations. Should there be a cost recovery charged to microinsurance and if so, how much should be charged? There is no general method of allocating overhead expenses between microinsurance operations or other business lines.

Most insurance companies still price microinsurance on a ‘marginal cost’ basis, including only the costs directly and exclusively related to microinsurance because most ventures are still experimental and sales volumes have not yet stabilized at a level that would allow them to contribute to overhead expenses. But as these move towards sustainability and higher volume, the question of ‘full pricing’ will be reconsidered. For now, microinsurance providers should at least be aware of such omitted indirect costs.

8.3.3 Gross premium and financial projections

Financial projections can be used as a method to determine gross premiums. Financial projections should be developed as part of the business plan. The outputs of financial projections are a series of prospective balance sheets, profit and loss and cash flow statements.⁵⁶

Developing projections involves modelling all of the various elements, including how they relate to each other, and how they vary over the projection period:

⁵⁶ See Garand and Wipf, 2011

- Insured volume
- Expected claims (based on the insured volume)
- Expected expenses (can be modeled in aggregate or relative to insured volume (or often both))
- Other economic and business assumptions (inflation, profit objectives etc.)

Preparing a reliable projection of future growth and expenses is no trivial task, and the pricing specialist will need to talk to all stakeholders and apply a lot of judgment in respect of economies of scale, inflation, efficiency gains and other relevant drivers. Different parties involved will likely have different, and possibly conflicting, views on sales growth, expense management and other crucial determinants, sometimes driven by pressure and expectations from investors, donors or other champions, who may or may not have sufficient understanding of the underlying financial mechanics to apply sound judgment. It is advisable to apply a dose of scepticism to bullish growth assumptions and efficiency expectations since many microinsurance business plans have not been met. A strong character is sometimes required to withstand pressure for unrealistic projections.

Once financial projections are determined, one can estimate the cost of expense per volume unit. As expected cost of expense per volume unit will not be constant through time, it is advisable to use a multi-year approach to determine the gross premium level. The timeframe to be used may depend on when the scheme will reach a stable size, as well as when the business plan assumes that the programme will become profitable. Care must be taken to inflate expenses using the experience and business plans of the programme and best estimate projections of the country's consumer price index.

Box 8.1: how to use financial projections to determine gross premium						
Volume	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Total
total number of people insured	500	2'500	4'000	8'000	12'000	27'000
Net Premium per person	245	245	245	245	245	1'225
total Net Premium	122'500	612'500	980'000	1'960'000	2'940'000	6'615'000
Expense Item						
Staff	40'000	45'000	50'000	55'000	60'000	250'000
Equipment	10'000	10'000	10'000	10'000	10'000	50'000
Other Expenses	15'000	16'500	18'000	20'000	22'000	91'500
Distribution	5'000	25'000	40'000	80'000	120'000	270'000
Total Expense	70'000	96'500	118'000	165'000	212'000	661'500
Expense per insured	140	38.6	29.5	20.63	17.67	24.50
Percentage of Net Premium	57%	16%	12%	8%	7%	10%

The table above illustrates the need for a multi-year approach when estimating expense loading. Indeed, while the number of insured is low, the cost per insured unit is very high, and decreases with volume growth. This is usually observed in a start-up operation. In the example, adding 140 to the net premium in year 1 will be too expensive. Therefore, a multi-year average approach is preferable, for example adding 24.5 to the premium of every insurance sold between year 1 and year 5 (and perhaps beyond). This implies that the insurer will lose money in the early years, which must be sourced from elsewhere. A business plan should quantify the amount of outside funding required under different scenarios, and provide guidance as to how much the insurance company is willing and able to afford.

In any case, pricing projections should be consistent with business plan assumptions.

9. Setting assumptions for the gross premium

Key messages:

The main parameters to be estimated are take-up rates and renewals rates. These require a deep understanding of the demand drivers, the distribution mechanism and the overall scheme management.

New business and renewal rates will impact on the expense assumptions significantly (e.g. spreading of fixed expenses). Special care should be taken to monitor and improve renewal rates.

The pricing specialist should not be over-optimistic when setting volume assumptions, as experience shows that take-up and renewal rates are often low in the first years of some microinsurance programmes. In cases where it is mandatory and the distributor is an MFI or co-operative, volume assumptions should be tied to the business plan of the distributor, however the distributor's history in achieving past business plans should be considered.

Success in microinsurance depends on many factors, including trust, simplicity, affordability and effective distribution.

Inflation and interest rate assumptions will impact the projections of expenses.

9.1 Volume assumptions

Setting volume assumptions requires

- Choosing the insured volume measure;
- Quantifying the target market; and
- Estimating the insured volume over time.

To begin with, one needs to define a convenient measure of insured volume that can be used consistently within the calculations. Insured volume can be defined in several ways:

- By number of policies;
- By insured units (persons, cars, cows, etc.);
- By sum insured (benefit amount); and
- By gross premiums written/sold.

It's important to choose a volume definition that is appropriate for the product and the distribution channel. In some cases, it can be helpful to use more than one definition in order to effectively model the business. The insurance provider needs to have a good understanding of the amount of risk that it is insuring, which includes not only the number of insured units, but also the potential claims.

For example, in modelling credit life insurance, it's helpful to use two related volume assumptions: the number of lives insured (which often also equals the number of insured loans), and the sum insured. Certain assumptions are tied to the number of lives covered or loans insured; for example, many expenses are incurred on a per insured or per loan basis, so it's important to know how many lives or loans are covered. However, claims costs will be related to the sum insured.

For credit life, insured volume decreases over time if only the outstanding loan balance is covered. Estimating claims or expenses can be done on the initial insured volume or average insured volume.

A good model makes use of both volume assumptions and lives insured, and includes formulae that relate them to each other (for example, the average sum insured per life, which may vary over time). As a second example, health insurance may cover a family unit rather than an individual. In setting the volume assumption, it may be necessary to use the number of policies, or the expected number of insured people, or a combination of both, in order to capture the necessary information.

The distribution channel can also affect the choice of insured volume measure, particularly if policies are issued on a group rather than individual basis. In this case, the number of policies, the number of insured lives, and potentially also the insured benefits, may all need to be incorporated into the insured volume calculations.

A second task is to quantify the target population, using the selected volume measure. This is easy for mandatory products, where the source population may be known (for example, all MFI members or all farmers working for a cooperative), but more difficult in case of voluntary products, where for example the target population is the low income population from a geographical area. Data from national censuses, surveys or studies, often collected by public organizations or NGOs can help in that process. The size of the target market may evolve over time; for example, the scheme may expand to new geographical areas.

In order to estimate the insured volume over time, the pricing specialist should define the following parameters:

- **Take-up rate:** This is the percentage of the population which participates in the programme. Take-up rates will evolve over time, as take-up may be low in the first period if the population is not familiar with the programme, grow once the product is accepted by the population and may level off or even decrease once all interested insured have enrolled.
- **Renewal rate:** Some policy holders may not renew their policies because they are not satisfied with the programme, because they migrate or simply because the coverage terminates. Coverage may end due to non-compliance with underwriting rules (if the insured person has reached the age limit for example). In calculating renewal rates one may or may not regard termination of coverage for such a reason as a non-renewal; rather it may be preferably viewed as an “**ender**”. Renewals rates usually vary by number of years in the programme. For non-term products an analogous measure is the **retention rate**.
- **Lapse rate:** Definitions of ‘lapse rate’ vary in insurance literature. In this guide, the lapse rate refers to the number of insured that lose coverage due to non-payment of premiums. Using this definition, lapses include non-renewals as well as cases where premium payments are late and the grace period has expired; in the latter case the insured may have a limited time period in which coverage can be reinstated with conditions such as paying all past-due premiums and perhaps some reinstatement charges as well.

Take-up rates, growth rates and renewal rates can be expressed in terms of any of the measures of insured volume, not just policies or insured lives. However, it is helpful to use more than one measure of insured volume, as noted above, in order to fully quantify the risk that has been underwritten. An example is group credit life policies – it is helpful to reflect growth rates as growth in policies (say, MFIs who have purchased insurance), and also by number of lives (insuring a larger MFI is more cost-effective than insuring a smaller MFI), number of insured loans, and sum insured.

In general, at time t , Insured Volume (t) = Insured Volume ($t-1$) + Take-up (t) * size of target market (t) + renewals ($t-1, t$) – lapses($t-1$) – deaths($t-1$) – enders($t-1$) - other terminations or withdrawals ($t-1$)

Insured volume often needs to be calculated at each period in preparing a financial projection, for example, monthly or quarterly, not just annually. Renewals are frequently only measured at the end of the coverage term, therefore only using a renewal rate will likely overstate the insured volume if other types of coverage decrements are not counted.

Insured volume over time is a critical assumption in the financial projections and used to allocate expenses and claims as described in the previous chapter. The volume assumption will also impact the calculation of the security margin discussed in chapter 3. Players in microinsurance have a tendency to overestimate the volume the product will reach, and one needs to realize microinsurance take-up will only grow with time and when confidence has been built in the target market.

Predicting those indicators is difficult, especially in the absence of previous information. As mentioned previously, interaction with various stakeholders to determine volume assumptions is necessary. Often though, the insurance is tied to other activities such as microfinance, and the MFI has already prepared a business plan which targeted number of loans issued, borrowers, loan volume, etc. In such a case it is useful to compare past business plans to actual growth realizations to determine if the targets are met or not.

Sometimes, different stakeholders may have different interests in setting growth assumptions (attracting investors or donor money, lobbying for internal support, etc. ...). Commercial or other microinsurance experience is very helpful in this regard, but one needs to adapt such data to the pricing situation. In most cases, it is very effective to work closely with all partners in a business planning setting and together derive take-up and decrement projections since these rates are highly dependent on programme design and management. In all cases, realistic targets are required around which commission and expense structures that support the target rates are then designed.

The following paragraphs highlight some key parameters which will impact future volume projections in a pricing exercise.

9.1.1 Parameters impacting take-up rate

To estimate the take-up level, the pricing specialist needs to consider the following aspects:

Is it a voluntary or mandatory product?

- Mandatory products will result in higher volume for the same target market.
- If not mandatory, group sales (to members of a cooperatives, or MFIs, for example) are often an effective way to reach scale.

Does the target population understand insurance? Are there other products in the market? What previous experiences with insurance has the target population had?

- A population with positive exposure to insurance will likely show higher take-up than a population with no knowledge of insurance.
- One may also assume that if consumer education⁵⁷ initiatives are conducted among the target population, take-up rates may improve.

⁵⁷ Financial consumer education definition: Financial education is “the process by which financial consumers/investors improve their understanding of financial products, concepts and risks and, through information, instruction and/or objective advice, develop the skills and confidence to become more aware of financial risks and opportunities, to make informed choices, to know where to go for help, and to take other effective actions to improve their financial well-being” - OECD – Directorate for Financial and Enterprise Affairs in the USA

Box 9.1: On the impact of consumer education on take-up rate

In South Africa, the South African Insurance Association (SAIA), the association of 60 short term insurers, is coordinating an industry initiative to disseminate financial consumer education to the low income market. Since 2004, the campaigns have reached 17 million people. Thanks to the support of the British aid agency, SAIA researched the impact of a radio educational campaign on take-up. Pre and post surveys were conducted among a target group, and showed an increase of 18% in the number of people who subscribed to insurance products after receiving financial education.

What are the measures in place to enhance the population's trust of insurance?

- Past microinsurance practice showed that trust is a major factor to unlock demand. Many surveys have highlighted the general distrust of low income population towards insurers, stating that “insurers are quick to get premiums from clients, but they never pay claims”.
- While estimating the potential take-up rate of a product, an assessment should be made of whether enough measures are in place to enhance the population's confidence in the product. For example, trust can be enhanced by working closely with a well-known entity in the market, such as a recognized MFI, a church or even a retailer. Co-branding of product can also lead to higher sales.

Box 9.2: Hollard/PEP funeral insurance

Hollard, South Africa's largest independent, privately owned insurance provider and PEP, a cash-based, low-margin, high-volume clothing retail store (with product offerings also including cell phones, airtime, prepaid electricity and insurance) created a joint venture arrangement in 2006 to provide insurance products to PEP clientele.

PEP and Hollard have developed a funeral product, providing family funeral coverage with a monthly premium to be paid at the PEP store. Starters' packs, including all product documentation, are sold off the shelf in all PEP stores. The product is branded by PEP, with limited mention of Hollard in the package, and PEP has both a financial and brand image liability if the insurance model should fail or be discontinued.

PEP is highly committed to providing low cost, high quality products to their clients and benefits from high levels of trust among the target market. When launched in 2006, the funeral product was experiencing a high claims ratio, partly due to higher anti-selection in this retail distribution model (with no face to face interaction with an insurance agent, people were more inclined to “gamble” on the deaths of family members). The option of increasing the price was not accepted by PEP, given their awareness of their clients' price sensitivity, and it was decided to launch new product offerings rather than adjust premiums.

The funeral product performance is one of the most successful in the African continent, with more than 200 000 active policies, representing about 1 million lives covered.

The active involvement of the trusted PEP brand in the design and performance of the product is one of the major reasons for the success of the PEP funeral product.

Source: Smith and Smith, 2010

Trust will also increase if insurers pay claims, and use evidence of claims payments in their marketing to the target population. A product with a low claims ratio, especially in the low income market, is likely to suffer from low take-up and bad word-of-mouth publicity. Adding non-insurance additional services to the product is one option and many microinsurance providers are testing this idea to increase the tangibility of insurance for clients. Additional services can include such elements as discounted access to pharmacy services for health insurance or regular SMS communication of weather forecasts and crop prices for index-based crop insurance.

On the other hand, in markets where the population has encountered bad practices from insurers lower take-up rates are likely, as trust needs to be rebuilt.

Does the product correspond to a need? Is the product design attractive to the population?

There will only be demand for products that correspond to a need of the population and are suitable to those needs. Based on previous market research, one should know the main risks faced by the target population. If the product does not address at least one of the major perceived risks affecting the market it is likely that take-up will be low. To date, landscape research shows that health and funeral insurance are two of the most popular products in microinsurance.

The simplicity of the product's processes will also impact the attractiveness of a product. Measures promoting inclusion, such as limited waiting periods and exclusions, rather than over-conservative claims control will positively impact take-up.

Box 9.3: on the impact of reducing waiting periods

Old Mutual South Africa, the country's first life insurer, has been active in the low income market since 2003, when it launched a group-based funeral insurance product. The product targets group such as burial societies (note 1), and offers a mandatory funeral product for all their members.

The product is a family coverage and can also include adult dependents if the option is chosen by the group. All products have waiting periods of 3 to 6 months.

The product is well accepted by the population, with close to 100,000 active policies in 2011, representing a 6% coverage rate of the 6.2 million people who make up the target market. To increase its penetration rate, Old Mutual tried a special offer for a limited period of time, where no or a limited waiting period was offered for new groups (who nonetheless had previous insurance experience) to join. The special offer proved very attractive to the market, with significant growth rates in that period. Old Mutual is in the process of assessing the impact in terms of additional claims paid, but the example shows that inclusive coverage has a strong impact on take-up.

Source: Old Mutual learning journey (Microinsurance Innovation Facility)

Note 1: A burial society is a group constituted for the purpose of providing, by voluntary subscriptions, for insuring money to be paid on the death of a member, or for the funeral expenses of the husband, wife or child of a member, or of the widow of a deceased member.

Experience also shows that products with limited choices for insurance options benefit from higher take-up rates.⁵⁸

What is the distribution model? What are the sale force incentives?

The distribution method will also highly impact sales. Findings show that face-to-face sales interactions are more productive than passive approaches (such as buying a 'starter pack' at a retailer, or calling a call centre to get information on a product).

Particular care is required in designing incentive structures for the sales force. As expected, the higher the incentive, the higher the take-up rate although it's very important to note that increasing incentives also increases mis-selling).

Training and reframing the marketing message can also strongly impact take-up. For example, sales of a property product (covering house and contents) sold through call centers in an African country has passed

⁵⁸ See Dalal and Morduch, 2010

from 4% conversion rate to 11%, thanks to a change of message from “insure your house” to “insure the contents of your house”.

What is the marketing strategy in place?

One should assume that take-up rate is highly correlated to the marketing campaign. Findings also show that above-the-line (ATL) campaigns⁵⁹ (such as TV advertisement, billboards) have limited impact on take-up rate, whereas village meetings, for example, may have a stronger impact on the target population. To adjust the take-up rate depending on marketing strategy, the pricing specialist may evaluate if the marketing campaign in place will effectively reach the target market.

From experience, in the case of voluntary products, coverage rates remain low in the first years, and one should try not to be over optimistic while setting take-up assumptions. A 30%-40%⁶⁰ take-up rate would reflect an effective sales strategy for a microinsurance product.

9.1.2 Parameters impacting renewal rate and lapses

Renewal rates are often lower in microinsurance than in mainstream insurance for many reasons. First, microinsurance premium payment is often cash based, and not automatically withdrawn from an account. The population is also not as familiar with insurance principles often struggles to pay the premium at every instalment. Passively managed programmes may expect 50% or lower renewal rates,⁶¹ showing the importance of focusing on renewal improvement in the sector. To estimate the future renewal ratio, the pricing specialist should consider the following dimension:

What is the premium payment process? What is the grace period?

The renewal process should be convenient and supported by a customer education process. Unlike renewals of mainstream insurance products, renewal of microinsurance is often not automated, and premium payment is not done simply through an automatic withdrawal from the customer’s bank account. Since active election and proactive premium payment is required to renew microinsurance coverage, then if this process is simple, efficient and accessible for the customer (and the product and offered services are valued), this will translate to a higher renewal rate and improved sustainability of the product.

To increase renewals, one should consider the frequency of payment to fit the cash flow of the target population, as well as setting a grace period that accommodates difficulties in paying the premium.

Does the monitoring system track renewals? Is the sales force incentivized to reduce lapse rates?

Renewal rates will be higher if internal processes are in place to track insured with upcoming renewal dates and implement reminders, such as sending SMS messages or through contact from the sale force. Similarly, if lapsed policies are tracked and processes in place to contact lapsed clients, renewal rates should improve. If the management information system (MIS) of a MFI enables the organization to flag policies about to expire, a credit officer could be handed this list to remind his clients of the upcoming renewal option.

Incentive models which take into account good renewal performance, such as paying bonuses if renewal rates are above a certain threshold, can positively impact the indicator.

⁵⁹ Wikipedia: ATL communications use media that are broadcast and published to mass audiences, Below The Line (BTL) communications use media that are more niche focused.

⁶⁰ This is indicative based on the authors’ experience

⁶¹ Management should target and maintain 80%

Does the product design promote renewal?

Elements of the design, like increasing the benefit coverage by time, or pay back of part of the premium if there is no claim can also improve persistency. Many insured may leave the scheme if they do not experience a claim in the first year (especially in health or in other short term insurance products), so non-insurance services or cash back may improve renewal rates.

Box 9.4: On the impact of experiencing claims on the renewal rate

In India, SSP, is a non-profit organization partnered with an insurer to offer their members in-patient coverage. In order to increase the value for their clients, SSP also developed a network of pharmacies and clinics in selected areas, where insured can get discounted access to general practitioners and drugs. Recent surveys showed that clients who did not use either out-patient or in-patient services had a 15 per cent renewal rate, compared to a 44 per cent renewal rate for those who used out-patient services, and a 50 per cent renewal for those who used both out-patient and in-patient services. Where discounted services were accessible, clients surveyed reported an 89 per cent satisfaction rate.

Source: SSP learning journey (Microinsurance Innovation Facility)

While insurers put a lot of effort into getting new clients, experience shows that more effort could be made to improve the renewal rate. Indeed, with a commonly observed 50% renewal rate across the sector, insurers tend to put a lot of energy and money towards increasing their portfolios through new clients rather than focusing on increasing renewals by improving client value.

What is the policy term?

Long term products (such as endowment products) suffer in general from high lapse rates as it is sometimes difficult for the low income market to maintain a regular payment schedule.

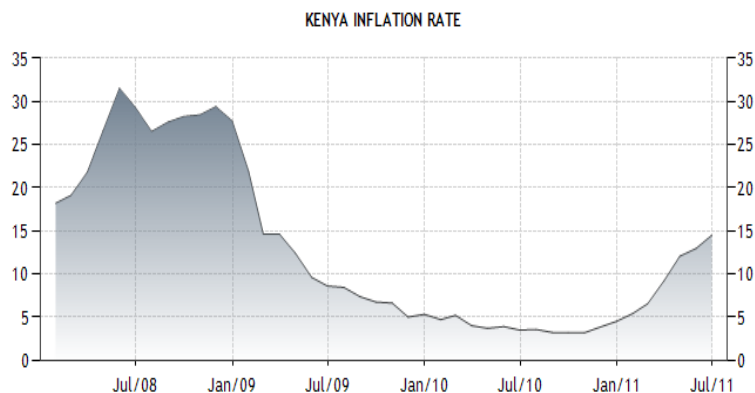
How easy is it to pay the premium?

If, for example, clients need to make a long journey to pay the premium, lapses may be more common. Premium payment could also be adapted to the seasonality of revenues to increase persistency.

9.2 Inflation and Interest

9.2.1 Inflation

Estimating inflation rates is important to calculating the projected expenses discussed in chapter 7. Inflation rates are dependent on factors such as political stability and economic outlook, both domestic and global. A country's inflation outlook is usually available from the World Bank, regional development banks and a country's banking regulator, but it is projected for only a year or so. If inflation is very



source: TradingEconomics.com; Kenya National Bureau of Statistics

volatile, it is more difficult to come up with reasonable assumptions, so it is best to use a conservative medium term average, while taking into consideration the country's aptitude for fiscal management and its economic prospects.

For the insurer, high inflation has both a negative and positive effect on profitability. Expenses increase rapidly

over the years in a high inflation environment, but the negative impact of this may be offset by the positive effects of higher interest rates and growth in insurance volume. For the customer, high inflation impacts savings, especially if rates have been locked in at a low interest rate; in such cases withdrawal rates can be expected to increase as better investment options are sought. Aside from the usual market preference for shorter term savings products, high inflation is another reason to offer short duration equity accumulation and savings plans, unless credited interest is variable and based on actual investment performance.

9.2.2 Interest rate

Interest rate assumptions are key variables for:

- Pricing long term insurance products, especially if there is a savings or equity accumulation component, as in the case of an endowment product. In contrast, the interest rate used to price a credit life product with a weekly premium paid alongside the borrower's loan repayment has less effect on the price, since premium is earned almost as soon as it is collected.
- Calculating reserves at the end of each financial period (monthly, quarterly, or annually) in the preparation of financial projections. Interest rates are applied to these and investment returns generated.

To estimate interest rates, one should investigate the investment options and estimate the returns for each asset class by duration. For setting the price, composite rates can be calculated and projected – for example, one could assume x% cash, y% 2-year time deposits, z% 10-year government treasury bills, and so on, based on discussions with the insurer, and considering the durations needed for best possible asset-liability matching for the product in question. In most developing countries, however, there are a very limited number of investment options, and it is necessary to work with what is available.

Forecasting interest rates is not easy, not even for economists and bankers. To estimate something for use in financial projections therefore requires a look at historical rates and should be discussed with all stakeholders. These include investment managers of insurance companies who follow the markets on a daily basis. For self-insured programmes, housed in an MFI or other, recent historical investment returns, investment plans, economic outlook and other relevant information may be used to come up with rates. Rates should be kept conservative. Since investment options are limited, it is advisable not to develop products with terms longer than the potential investment horizon.

9.3 Breakeven assumptions

Breakeven assumptions will impact the time frame envisaged for premiums to cover all expenses. A medium/long term approach to financial sustainability should be adopted for microinsurance activities, depending on the line of product. For example, credit life products can be profitable in the first year of the programme, whereas health insurance may require a longer period to generate profits.

9.4 When outsourcing to an external consultant

The internal pricing specialists should become involved in defining the volume assumptions. Often, they will be asked to provide the organization's business plan to the consultants. The internal pricing specialist should also be consulted in order to estimate the expenses, as he or she knows the local market.

In any case, the internal pricing specialist should fully understand the assumptions made by the consultant so that she will be able to explain them to the different stakeholders.

10. Validating the gross premium

Key messages:

Increasing premium rates after product launch will be met with considerable resistance. Therefore finalizing it should involve careful testing.

It is best to pilot test a product before roll out so that corrective actions can be made at a small scale. For this, selection of a representative group for sampling is required so that similar experiences can be expected when the product is scaled up.

It is crucial to test alternate scenarios to investigate how results may differ from the base scenario used for financial projections.

This exercise is equally valuable after the launch of the product: comparing the actual observed behaviour of the modelled variables with their projected values gives an early indication of how good the initial assumptions were, and of how dynamic and predictable (or seemingly random) key profit drivers are.

Using a model is a powerful tool to moderate discussion between different stakeholders.

10.1 Do reasonability checks and adjust

Once the gross premium has been set, the product development team should revalidate whether the premium amount will be acceptable for future clients. In order to do so the gross premium can be compared with the following information:

- **Related costs for the client:** It is also advisable to compare the gross premium with all costs the client will incur while insured including transportation for registration and to receive services, required documentation (photo, certificates etc.), credit if the premium is financed through a loan, and so on.
- **The expected claims amount over the course of the coverage:** To ensure the product provides value, the cost of the product should be compared to the actual sum insured, as the market probably will do also.
- **Other products/premiums on the market:** In a previous data gathering exercise, competitor information should have been gathered. It is important to note that in microinsurance some schemes may be subsidized, leading to a lower gross premium than expected if calculated on a “full cost” basis. It is still important to identify those differences and position the programme against the competition. See “note on premium subsidies” below.
- **Other products of the insurance company:** It is important to make sure that the new product follows a logical positioning within the company. If the new product offers more benefits than an existing one, its price should be higher as the contrary may be confusing for sales staff and future clients.
- **Alternatives:** The target market may have traditional ways to cope with risks, so the final gross premium should be compared with the costs of those options.

Defining the gross premium is a collaborative process, and should involve all stakeholders in the programme. The product development team must ensure that the price is acceptable for the market; the

distribution channel will negotiate both its level of commission and the acceptability of the price for its prospective customers, and management will decide on the profit margin to apply.

In order to accommodate discussions between all parties, the pricing specialist has a key role to play in highlighting the impact of different options on pricing and sustainability. A simple model set up in Excel is a powerful illustration tool to moderate the discussion and help reach sound management decisions.

At the stage of determining the gross premium, if gross premium is too high, a review of pricing assumptions and/or the product design and features is again necessary, both at net premium and gross premium pricing levels. This iterative process will continue until a suitable price is agreed between all stakeholders.

Note on premium subsidies:

Sometimes an insurer may decide to subsidize premiums initially, hoping that the target market will have a good first experience with insurance, thereby building trust and gradually overcoming willingness-to-pay barriers. The intention is to change the premium and cover to more commensurate and sustainable levels over time. This is somewhat risky because generally it is very difficult to reduce subsidies in the future, either by raising the price or decreasing benefits. Taking away something that the insured have come to value will result in protest that will turn everyone in the value chain against the insurer, with the pricing specialist bearing the brunt of this.

10.2 Do Scenario tests

10.2.1 What is scenario testing?

If programmed on a computer, financial projections allow for scenario testing on “what-if” questions. Indeed, even the most expertly thorough pricing does not guarantee that the premium will be sufficient next year, and this applies both to conventional insurance and to microinsurance. There are two reasons for this: firstly insurance claims are random in nature, so deviations from statistical predictions are always possible even for large risk pools; secondly, projecting the many determinants of premium sufficiency with accuracy is impossible. Therefore, the best one can do after the final premium has been determined is to model the likely impact of different scenarios and answer the “what-if” questions, such as:

- What if twice as many insured die as anticipated?
- What if insurance sales fall short of projected volumes?
- What if aggregate premium revenue is lower than expected because more children or women than anticipated take insurance?
- What if insured hospital bills are twice as high as anticipated (maybe because of medical inflation, dramatic exchange rate movements or additional taxes)?

What if more experienced staff become necessary, causing higher than expected salary expenses? Modelling scenarios will not tell what will happen either, but the process aims to predict what the likely consequences will be if one event or another happens.

10.2.2 How to conduct the test

With a computer and a spreadsheet it is not difficult to model different scenarios, although the degree of complexity increases with the degree of detail.

The example below, presenting a five year financial projection for a hospital cash product, shows how financial projections could be refined using a scenario testing approach.

Insured Portfolio	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
number of new persons insured	500	2'200	2'400	5'300	6'400
number of persons renewing insurance		300	1'600	2'700	5'600
total number of people insured	500	2'500	4'000	8'000	12'000
premium per person	75	79	83	87	91
total premium revenue	37'500	196'875	330'750	694'575	1'093'956
number of claims	20	100	160	320	480
average claim amount	1'200	1'260	1'323	1'389	1'459
total amount of claims	24'000	126'000	211'680	444'528	700'132
claim per person	48	50	53	56	58
Expenses					
Staff	40'000	45'000	50'000	55'000	60'000
Equipment	10'000	10'000	10'000	10'000	10'000
Other Expenses	15'000	16'500	18'000	20'000	22'000
Distribution	5'000	25'000	40'000	80'000	120'000
Total Expense	70'000	96'500	118'000	165'000	212'000
Expense per insured	140	39	30	21	18
Profit / Loss	-56'500	-25'625	1'070	85'047	181'824
Key Performance Indicators					
Net Income Ratio	-151%	-13%	0%	12%	17%
Incurred Expense Ratio	187%	49%	36%	24%	19%
Incurred Claims Ratio	64%	64%	64%	64%	64%
Renewal Rate Ratio		60%	64%	68%	70%
Growth Ratio		400%	60%	100%	50%

Profits are projected after the third year, so the outlook is promising. But what if the expected incidence rate were too low?

As described in an earlier chapter, health microinsurance programs often start with low claims ratios and then experience steeply rising utilization, before claims converge towards their long term equilibrium. Furthermore, since the target market previously had no health insurance and is likely to have some ailments carried forward, incidence rates should be adapted through the duration in the scheme. It is expected that incidence rates for those new to the scheme will be below average in the first year (while they learn how to make use of insurance), above average in the second year (when they make use of the insurance to address pre-existing conditions) and average thereafter (when their health status has improved and is similar to that of others who have had health insurance coverage for several years.).

This can be easily modelled by adding three rows and some formulae to the sample spreadsheet:

Insured Portfolio	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
number of new persons insured	500	2'200	2'400	5'300	6'400
number of persons renewing insurance		300	1'600	2'700	5'600
total number of people insured	500	2'500	4'000	8'000	12'000
premium per person	75	79	83	87	91
total premium revenue	37'500	196'875	330'750	694'575	1'093'956
incidence new insureds	3%	3%	3%	3%	3%
incidence after first renewal		7%	7%	7%	7%
incidence after subsequent renewals			4%	4%	4%
number of claims	15	87	175	300	503
average claim amount	1'200	1'260	1'323	1'389	1'459
total amount of claims	18'000	109'620	231'525	416'745	733'680
claim per person	36	44	58	52	61
Expenses					
Staff	40'000	45'000	50'000	55'000	60'000
Equipment	10'000	10'000	10'000	10'000	10'000
Other Expenses	15'000	16'500	18'000	20'000	22'000
Distribution	5'000	25'000	40'000	80'000	120'000
Total Expense	70'000	96'500	118'000	165'000	212'000
Expense per insured	140	39	30	21	18
Profit / Loss	-50'500	-9'245	-18'775	112'830	148'276
Key Performance Indicators					
Net Income Ratio	-135%	-5%	-6%	16%	14%
Incurred Expense Ratio	187%	49%	36%	24%	19%
Incurred Claims Ratio	48%	56%	70%	60%	67%
Renewal Rate Ratio		60%	64%	68%	70%
Growth Ratio		400%	60%	100%	50%

The sum of profits and losses over the five years is only 2% lower, but positive cash flows take one more year to emerge. Although the venture needs less upfront capital now, it needs it for longer.

Suppose defining the right renewal rate is under debate among the stakeholders with the product development team thinking that 60% is too optimistic and the chairman of the distribution partner, an experienced pro-poor NGO, arguing that the social agenda of the project mandates that people will express their enthusiasm for the insurance by high renewal behaviour. The same spreadsheet allows the pricing team to assess the financial impact of a change in the renewal rate:

Insured Portfolio	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
number of new persons insured	500	2'300	3'000	6'400	8'800
number of persons renewing insurance		200	1'000	1'600	3'200
total number of people insured	500	2'500	4'000	8'000	12'000
Profit / Loss	-50'500	-4'205	9'008	148'948	240'168
Key Performance Indicators					
Renewal Rate Ratio		40%	40%	40%	40%
Insured Portfolio	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
number of new persons insured	500	2'100	1'950	4'700	5'400
number of persons renewing insurance		400	2'050	3'300	6'600
total number of people insured	500	2'500	4'000	8'000	12'000
Profit / Loss	-50'500	-14'285	-38'620	98'244	116'187
Key Performance Indicators					
Renewal Rate Ratio		80%	82%	83%	83%

The increased renewal rate reduces the cumulative profit by 230,000. At this point, there may be a need to moderate a discussion on desirable and acceptable levels of profitability.

In this example, the base case assumes that the average claims cost will increase by 5% every year, and that premium increases by the same amount. But what if claims costs were to increase by 8% every year? The result would be a reduction in cumulative profit of 140,000. Would this still be acceptable?

	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
average claim amount	1'200	1'296	1'400	1'512	1'633
total amount of claims	18'000	112'752	244'944	453'496	821'191
Profit / Loss	-50'500	-12'377	-32'194	76'079	60'764

What if claims costs would increase not by 8% every year, but on an annual compounded basis, perhaps because on-going currency devaluation makes imported drugs and supplies ever more expensive, or because the inflow of donor money and NGO projects (perhaps of a recent high profile natural catastrophe) can be expected to drive up salaries of medical personnel?

	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
average claims growth		8%	9%	11%	12%
average claim amount	1'200	1'296	1'413	1'568	1'756
total amount of claims	18'000	112'752	247'212	470'409	883'366
Profit / Loss	-50'500	-12'377	-34'462	59'166	-1'410

Even assuming average claims costs only grew by 5% per year, how robust would the programme be in case an earthquake hit the insured population, causing claims incidence to go up sharply and average costs to grow beyond past and projected trends, due to scarcity of medical supply?

	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
incidence new insureds	3%	3%	10%	3%	3%
incidence after first renewal		7%	10%	7%	7%
incidence after subsequent renewals			10%	4%	4%
number of claims	15	87	400	300	503
average claim amount	1'200	1'260	1'500	1'389	1'459
total amount of claims	18'000	109'620	600'000	416'745	733'680
claim per person	36	44	150	52	61
Profit / Loss	-50'500	-9'245	-387'250	112'830	148'276

This picture is likely to stimulate the quest for appropriate reinsurance (which may or may not be available). Reinsurance will require additional refinement to the model: retained premium revenue will be lower after paying the ceded reinsurance premium, but claims will be lower as well, or their variation will be at least reduced (depending on the type of reinsurance).

A large earthquake in year 3 would have all sorts of other consequences that should be incorporated into the modelling of this scenario. For example, insurance sales could be lower than anticipated in following year(s) because people will struggle to rebuild their lives and will have even less income or sales could increase due to heightened awareness of the need for insurance. Many could possibly migrate to other areas or receive free healthcare from NGOs. The company's premises, staff and equipment may be affected and so on.

Testing scenarios on a reasonably refined projection model is enormously valuable at the outset to decide upon key parameters such as premium, commission and initial investments, and to show how things may vary from projections because of the inherent variability of the many determinants of profits or losses.

However, this exercise is equally valuable after the launch of the product: comparing the actual observed behaviour of the modelled variables with their projected values gives an early indication of how good the initial assumptions were and of how dynamic and predictable (or seemingly random) key profit drivers are. As long as there is no reason to overhaul the whole model and question basic mechanics (such as that claims incidence changes with renewals), updating key parameters according to the latest observations will immediately provide a new and more accurate projection for the years to come. This in turn will show how problematic deviations from expected paths are, and how urgent corrective action is. It also helps to calibrate such corrective action.

One obvious and recommended refinement on the simple example discussed here is to project not on an annual but on a quarterly or monthly basis. When full calendar year figures come in, it may be too late to take corrective action, and stakeholders will be eager to compare actual with expected results more often than once a year. But the pricing specialist should balance the additional effort of moving from a quarterly to a monthly basis with the additional benefits, keeping in mind the expected timeline of incoming data.

Finally, such a projection model can be an excellent instrument for communicating with all stakeholders. It brings utmost transparency to the discussion and is the best possible platform for rational decision making. Transparency has its disadvantages, though: whenever one party discloses the cost it anticipates to incur in delivering a service, there will be someone questioning efficiency; and whenever a party discloses the anticipated profit it expects to make there will be someone questioning their share.

10.3 Pilot testing

Even with the best estimation on assumptions, detailed reasonability checks and thorough scenario testing, only experience will validate whether or not the premium and product is suitable for the market. Pilot testing should take place on a new product before launching it on a large scale. During the pilot phase, assumptions should be compared against real client behaviour and an evaluation should be made as to whether the gross premium is affordable.

The “story” does not always end here. In order to achieve the scale necessary for sustainability, providers of microinsurance often explore additional distribution partnerships. New distribution partners may well have their own ideas about product features and premium. Even after a product has been successfully introduced, accepted by the market and demonstrated that its price is appropriate, tough negotiations may be necessary with new distributors. They can have considerable bargaining power and often want to maximize their own utility (e.g. in terms of commission) and their clients’ (e.g. in terms of value for money) without always being sensitive to the needs of the provider. But as a microinsurance venture only has a chance to become permanently viable if all parties’ needs are considered, technical and diplomatic skills are needed to mediate and help everyone find a fair compromise.

10.4 Outsourcing to an external consultant

If pricing activities are outsourced, the internal pricing specialist should conduct the reasonability checks and ask the consultant to provide their different scenario results for discussion.

The internal pricing specialist will be the gate keeper to ensure that assumptions made in the pricing process correspond to past observed experience and take prompt reactive actions if there are significant deviations. It is then crucial for the pricing specialist to fully understand how the net and gross premiums were calculated.

11. Monitoring product experience

Key messages:

Monitoring is a process, which starts at project inception. Clarification upfront of what to monitor and how it will be done is required.

Both quantitative and qualitative monitoring can be used.

Erroneous and incomplete data can be more of a liability than an asset if misinterpreted.

A monitoring protocol should be followed, clarifying the reporting format and frequency, and assigning responsibilities for information generation.

Only monitoring enables product improvement.

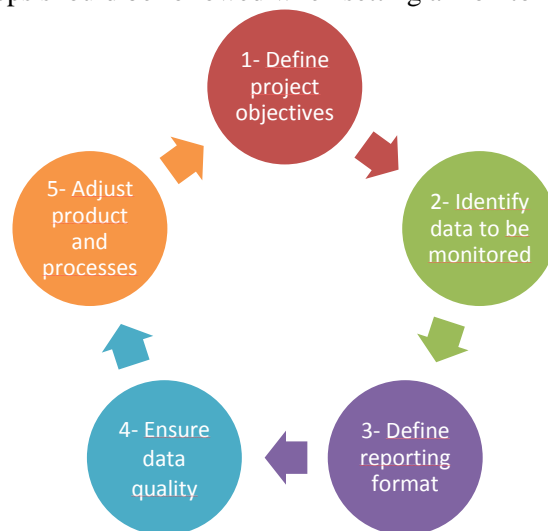
11.1 Definition

Monitoring is the regular, systematic observation and recording of activities taking place in a project or programme. It is a process of routinely gathering information on all aspects of the project.

Information is like gold to an insurer. By carefully tracking and recording information, the insurer will start building the experience to improve its understanding of the risks covered and insured behaviour. Careful attention to rigorous and efficient monitoring activities is even more important in a new market such as microinsurance.

Monitoring is about providing valuable and accurate information to inform decision makers on how to reach a programme's objectives. This not only means making more data available, but also making the data more accessible and presented it in a more meaningful and understandable language and format.

The following steps should be followed when setting a monitoring plan:



11.2 Define project objectives

Monitoring is a tool to assess whether a programme or product meets defined objectives. A microinsurance business may have slightly different objectives than most traditional businesses since it is concerned with both profitability and social goals. The institution engaging in microinsurance should have a clear mission and vision attached to its microinsurance strategy, and monitoring should match the agreed statements made in the mission and vision declarations.

But even if microinsurance corresponds to social responsibility goals, clear monitoring of performance, including financial performance should be undertaken.

For the pricing specialist the primary objectives of monitoring are to:

- Compare pricing assumptions to actual experience, in order to potentially review product pricing and design;
- Analyze claims experience and identify potential fraud and/or adverse selection patterns;
- Monitor financial sustainability by comparing actual income and expenses to the business plan (this role may be shared with an accountant);
- Understand client profile and purchasing behaviour, by analyzing the data generated.

Monitoring could also track:

- Impact of communication/marketing campaign
- Efficiency of sales staff training and/or incentive programs
- Impact of education campaigns
- Any other activity the project is willing to test (provided it can be measured)

11.3 Identify the data and indicators to be monitored

11.3.1 Quantitative analysis

Below is a list of generic information which could be recorded to enable data mining for monitoring purposes. All data mentioned here are not relevant for all programmes and should be adapted to the context. It is particularly important to record all the assumptions used in the pricing process (the claim frequency and expected claim amount used, but also the underlying assumptions on the portfolio structure, or client behaviour).

Table 11.1: Primary data needed for monitoring

	<i>Comment</i>	Objective	Source
Beneficiaries' information			
Unique identifier or key	<i>Use national ID number if the country has one, otherwise, the scheme will have to generate its own unique ID number that clients should retain throughout their history with the programme</i>	This data is used to prepare a demographic profile of the group, which is needed for projecting future mortality trends.	MIS/registration form
Gender			Registration form
Date of birth			Registration form
Marital status			Registration form
Number of children	<i>Calculated field if beneficiary and covered dependents history is kept. Better if data on all family members is included in the database.</i>		Registration form
Name			Registration form
Date of enrolment in the scheme			Registration form
Primary occupation/livelihood			Registration form
Residence: urban or rural, city, province			Registration form
Beneficiaries and covered dependents	<i>For health insurance, some of the same data should be maintained for each covered dependent, including name, unique identifier, gender, date of birth, relationship to the participant and a photograph</i>		Registration form
Distribution branch		Distribution channel performance	Registration form
Sale agent code		Sales force performance, can be used to calculate incentive and commission	Registration form
Coverage history			
Coverage detail			Registration form
Date of effective coverage	<i>A coverage history for each enrolled person has to be kept, not just the coverage currently in effect</i>	Analysis of product up-take and pattern	Registration form/MIS

	<i>Comment</i>	Objective	Source
Premium history	<i>For each product, a premium payment history must be kept for each insured</i>	Besides being needed for administration purposes, the premium history will be used to study the pattern of dropouts (lapses and surrenders), which in turn will affect the pricing of many products. For products with savings and equity accumulation features, the pay-out values will depend on the premium history since interest must be credited accordingly	
Payment date			Accounting database/receipt from sales force
Payment amount			Accounting database/receipt from sales force/MIS
Payment method mechanism			Accounting database/MIS
Receipt number if applicable			Accounting database/receipt from sale force
Reason for dropping out			Drop out questionnaire
Claims history			
Date of occurrence	<i>Claim information should always be linked to the beneficiary database, in order to enable claim experience analysis</i>	The claims experience is crucial for on-going management and monitoring purposes, and is also a primary source of information for pricing. Assess the performance of time taken to pay claims. Calculate claims reserves	Claim form
Date of report to the insurer			Claim form
Date of payment			MIS
Cause of claim (for health claims, the cause of the claim could be recorded in International Classification Disease (ICD) format and charges should be broken down by benefit category)⁶²			Claim form
Incurred cost			Claim form
Status (pending, rejected, approved)			MIS
Claim paid amount			MIS

⁶² The ICD table was developed by WHO and assigns a code to various disease categories. The most recent ICD table is available on the WHO web site.

	<i>Comment</i>	Objective	Source
Incurred expenses			
Start up and development cost	<i>All incurred expenses should be recorded, with a clear allocation rule for indirect expenses⁶³</i>	Monitoring expenses is crucial to monitor the product profitability. Direct and indirect expenses should be recorded	Accounting system, other
Marketing and distribution costs			
Back office costs			
Other information used for pricing assumptions			
Claim frequency			
Expected claim amount			
Portfolio composition			
Other			

Notes:

- All records should be kept indefinitely, either in the current database or in an archive, for cumulative experience and actuarial analysis. The data should be carefully managed, just like any other resource of the microinsurance programme.
- Data collected should be granular enough to enable segmenting risk analysis (by distribution channel, by age, by income level etc.)
- Data collection should be an integral part of the different processes: enrolment, premium collection and claims. The forms related to each of these processes, whether paper-based, electronic or otherwise, should capture the information necessary for product management purposes.

The above information should enable calculation of a wide range of indicators. The list below highlights the main financial indicators, which have been adapted for microinsurance by BRS⁶⁴ and ADA⁶⁵. More information is available at: <http://www.microfact.org/microinsurance-tools>

Table 11.2: Some performance indicators to calculate and monitor trends

<i>Category</i>	Indicator	Definition
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⁶³ Indirect expenses such as infrastructure cost, salaries of cross cutting functions should be allocated to the microinsurance product.

⁶⁴ The Belgian Raiffeisen Foundation (BRS) supports sustainable development projects and strives to help the poor in developing countries become self-reliant. BRS is the international social arm of the financial group Cera. It provides financial and technical support to local savings, credit and insurance initiatives that reflect the cooperative values of collaboration, solidarity, participation, and respect for individuals. Find out more at: <http://www.brs-vzw.be/Functional/LanguageChoice.aspx?ReturnUrl=%2fDefault.aspx>

⁶⁵ Appui au Développement Autonome (ADA), is a Luxembourg based NGO created in 1994. Its mission is to support microfinance activities as a means to alleviate poverty in developing countries. ADA has focused its activities on the support of MFIs. Find out more at: <http://www.microfinance.lu/>

Category	Indicator	Definition
<i>Product value</i>	Incurring expense ratio	This is the proportion of the premium used to pay all the costs of acquiring, writing and servicing insurance
	Incurring claims ratio	The incurred claims amount to earned premium for a given accounting period
	Net income ratio	The net income amount to earned premium for a given accounting period
<i>Service quality</i>	Promptness of claims settlement	Time from the date of the covered event occurrence until the date the payment to the beneficiary is settled or refused
	Claims rejection ratio	The claims rejection ratio is the proportion of claims that has been disqualified for benefit payment, for whatever reason
<i>Product awareness & client satisfaction</i>	Renewal rate	For a particular period or sample, the ratio of participants that renewed to those who could have renewed Similar ratio: retention rate
	Coverage ratio	The proportion of the target population participating in the microinsurance programme Similar ratios: participation rate, outreach ratio, penetration rate
	Growth rate	Growth of the microinsurance programme in terms of number of insured Similar ratios: growth in premium income, claims payout

11.3.2 Qualitative monitoring

The quantitative monitoring could be supplemented by qualitative research, such as:

- Conduct satisfaction surveys;
- Gather front line staff feedback on sales challenges, processes improvement etc.
- Research cause of drop outs by interviewing clients who did not renew their policies;
- Interview key stakeholders to understand unknown behaviour (especially for health).

11.3.3 Design reporting format

Together with the management and other involved stakeholders (partnering institution, IT department, product champion, sales manager, claims department representative), a monitoring protocol should be agreed on. This protocol should at least include the following information: indicators to track; source; input to report; frequency of reporting; responsible persons.

Table 11.3: Example of the monitoring protocol

Objective	Indicators	Source	Input to report X	Frequency of report	Responsible person
Penetrate untapped market	Coverage rate by region	MIS	Portfolio analysis report	Every 6 months	Pricing specialist
	Proportion of low income/informal workers insured	Survey/ MIS	Portfolio analysis report	Once a year	Market research department
Be sustainable in 2-3 years	Net income ratio	MIS	Product performance report	Monthly	Pricing specialist
	Claims ratio (frequency and average claim)	MIS	Product performance report	Monthly	Pricing specialist
Provide value to clients	90% of clients satisfied	Client satisfaction survey/Focus Group Discussion	Social performance report	Once a year	Market research department
	Renewal rate		Social performance report	Monthly	Pricing specialist
	Claim payment < 3 days	MIS	Social performance report	Monthly	Pricing specialist

example

- The report format should be agreed on with management, and should include indicators, trends and written analysis.
- Reports should also be provided to front line staff in order for them to understand the insurance concept and communicate more effectively with the end client. As previously mentioned, the goal should be towards greater transparency.
- Sharing appropriate reports with distribution or other partners can also be very helpful to avoid disruptive surprises, and jointly-conceived corrective measures should be developed as necessary.
- The usefulness of reports should be assessed periodically.

11.3.4 Ensure data quality

Great importance should be attached to the way data is collected and managed because erroneous and incomplete data can be more of a liability than an asset if misinterpreted.

Towards improving data quality:

- Data must be correctly entered in the source documents (registration and claim forms, surveys and so on). Data capture by persons who have no specific training and have other priorities has to be facilitated as much as possible, by providing convenient tools and finding a suitable balance between the desire for data detail and the effort needed to capture it. To improve data entry quality, forms should be easy to complete (with use of pre-coded information where possible), staff in charge of data collection and data capture should be properly trained, and the quality of the data provided could even be part of the staff evaluation and/or incentive model.

- Robust controls and thorough cross-checking should be built into the MIS. Standard coding values and formats should be used to simplify queries and to improve consistency. For example, participants' occupations should be selected from a menu of standard occupation codes rather than being encoded in each time. If information is captured in Excel, careful attention should be given to reduce risk inherent in Excel flexibility. Relying on unprotected Excel sheets for analysis of large amounts of data is dangerous; data can easily be deleted or formulae overwritten by accident. Using Visual Basic and appropriate protection can make Excel files more reliable and the analysis more credible and reproducible.
- All data should also be verified as far as possible against other independent systems (if any), such as accounting. For example, premiums, commissions and claims must be balanced against the accounting system at the end of each accounting period to make sure that there is consistency between the two systems (which is also a very useful integrity check for the accounting system).
- Pricing specialists should mine the data and conduct reasonability checks by comparing key indicators with reality. Examples:
 - ✓ Is the age distribution of customers in line with reality?
 - ✓ Are medical claims paid out similarly from one health care facility to another? If not, why?
- Random checks are valuable. Every so often, a sample of data should be selected and checked against the source. Errors found should be communicated and data encoders alerted.
- Analytical tools can be easily programmed to analyse a database. Records with errors should be highlighted and the types of errors using codes recorded in a special free-format error field.

In some cases, external auditors may have to review the data stored by an insurance provider and their criteria and needs in terms of data capture, storage and analysis must be considered.

Delayed encoding generally affects quality of data. This also diminishes the effects of monitoring, analysis, and reporting which in turn delays the ability to take corrective actions.

11.4 Adjust product and processes

Monitoring helps with learning and improving activities. For pricing, one should compare actual experience (claim incidence, average claim cost, family size) to the assumptions made previously. Pricing assumptions should be validated against emerging experience.

Table 11.4: Excerpt from an experience review report

Parameter	Incidence rates used in pricing (Expected)	Actual incidence (per member exposure)	Actual/Expected for the study period
Member mortality	0.14%	0.177%	122.7%
Member hospitalization	2.00%	3.590%	179.7%
Spouse mortality	0.58%	0.565%	96.7%

The analysis in table 11.4 may imply product re-engineering and re-pricing and/or process change (such as reinforcing claim control).

Before the pricing review, one should remember that time and experience volume are two important parameters to take into account before defining a relatively stable risk pattern. Premium level should not be changed after few months of experience. Trends such as low incidence in the first month, then high consumption are trends usually observed for a new product. Changing premium rates too frequently cause confusion and increased costs (re-printing marketing material, changing IT systems and training staff again), but not changing them when experience clearly indicates there is a problem is also dangerous.

An in-depth analysis of risk patterns per segment could lead to the identification of potential fraud or adverse selection. The pricing specialist should then propose new claim control mechanisms (such as waiting periods, ensuring group coverage, implementing medical protocol validation etc.), and continue to monitor the outcome of the implemented change.

12. Summary

As seen in this technical guide, pricing is a continuous process which is similar regardless of the insurance product and delivery model. It starts with a product prototype, developed on sound market research and requires the pricing specialist to go through the subsequent steps of collecting relevant data, setting the assumptions to be used in the pricing, calculate the premium, sometimes using a model, and finally, validating the final outputs of the calculation. Though those steps are the same in traditional insurance pricing, they have to be adapted to the microinsurance context:

- Collecting data may be challenging in an environment where little experience data is available, or is of limited quality, reinforcing the need for proper understanding of the programme context and validation of all information collected.
- Setting assumptions for a new market will differ from setting assumptions for a well-known traditional one since a) the behaviour of the target population is different; b) the market has limited experience with insurance; c) risks facing the market may vary from available data based on geographical or occupational specifics; d) Take-up and renewals assumptions will be difficult to predict. More than for mainstream insurance, setting assumptions will highly rely on sound judgment and knowledge of the market. This becomes easier as the pricing specialist develops her skills and experience.
- Even though formulas used to calculate both the net and the gross premium are identical in all situations, it will only make sense to use complex models and advanced mathematics in microinsurance once there is enough reliable data to build a robust model. This technical guide attempts to reference some of the potential techniques to be used at the calculation stage of the pricing cycle, so that with increasing microinsurance data, the pricing specialist could look for appropriate references to build a more complex pricing calculation.
- Finally, validating the gross premium for microinsurance will also require microinsurance specific information, such as determining the willingness to pay of the target population and analysis of informal practices to apply competitor benchmarking. The pricing specialist will also have to decide on the appropriate margins inherent in the gross premium and contain the common temptation of being too conservative. A fair price must be derived which enables the institution to fund future development of its microinsurance activities but yet remain affordable for a market with limited resources.

If, at the inception of a microinsurance program, exposure pricing is required to set an initial premium with the help of a simple pricing model (it does not make sense to build a complex pricing module using low quality data), as experience develops over time, pricing specialists should be able to use experience data to fine-tune their model and assumptions. Therefore, it is very important to consider data as the main asset of a programme, and to carefully consider how to improve its quality and archive it.

Careful monitoring of the products is required which implies that all relevant persons in the company, from the management to the front line staff, set monitoring tasks with adequate level of priority.

The future success of microinsurance will be highly correlated to setting sustainable and affordable premium levels. The Pricing Specialist will therefore play a vital role in establishing and maintaining the reputation of microinsurance ventures in new and developing markets.

Glossary⁶⁶

Ability to pay: The ability to pay is the maximum amount a person can afford to pay, sacrifice or exchange in order to receive a good or to avoid something undesired, such as pollution.

Actuarial present value: In plain language, actuarial present value refers to the estimated current value of a monetary amount payable or receivable in the future. In calculating the current value, the actuary discounts the future amount to the present day by incorporating the time value of money (i.e. considering that investments earn interest, dividends, or appreciate in value) and the probabilities and timing of all events that determine whether or not the said amount will actually materialize.

Coverage rate: Loosely speaking, it is the proportion of eligible persons in a target market participating in an insurance programme at a given point in time. The term is often used interchangeably with participation rate and penetration rate.

Covariant risk: A risk, or combination of risks, that affects a large number of the insured items/people at the same time. Examples are earthquakes, major floods, and disease epidemics.

Credibility pricing: Credibility pricing involves combining exposure and experience data in a mathematical way. Credibility can be described as the amount of predictive power assigned to an estimate.

Deductible: Also known as excess in some countries, it is the amount that must be deducted from a claim (or from a cumulative claim amount) before the insurer will step in and pay a portion of the remaining amount.

Dropout rate: For a given period or sample, the dropout rate is the ratio of those clients or members that did not renew their coverage (or remain in the programme) to those that are eligible to renew (eligible to remain). The dropout rate is the opposite of the renewal rate and persistence ratio.

Eligibility: The criteria by which one is able to purchase an insurance policy; intended to control adverse selection (for example, there may be age restrictions that prevent people above or below a certain age from accessing insurance).

Exclusions: Exclusions are conditions or circumstances under which an insurance programme will not provide benefits; also known as exceptions.

Expected claim amount: This is a general term and may refer to a number of things. For one, it could mean the *probable individual claim amount if the insured event actually occurs*. Second, it could mean the *expected aggregate claim amount* for a given block of insurance business over a certain time period such as a year. Third, this expected aggregate claim amount is the sum of the *individual expected claim amounts* calculated prospectively for all insured risks using actuarial methods and considering each insured risk's individual parameters (for life insurance the insured risks are persons and the important parameters age, gender, and several more).

⁶⁶ Adapted from the Microinsurance Network Lexicon: <http://www.microinsurancenetwerk.org/lexicon.php>

Expected claim frequency: Also known as claim frequency or utilization rate, the expected claim frequency is the expected number claims to be incurred divided by the number of risk exposures (units of insured risks) within a given coverage period.

Expected present value: See actuarial present value.

Experience pricing: The process of determining the premium rate for a group risk on the basis of the group's experience. If the group does not have experience, a proxy group with similar characteristics is sometimes used.

Exposure: See risk exposure.

Exposure rating / pricing: A method of rating, usually applied to excess-of-loss reinsurance, where rates are based on analyses of the inherent exposure in the business to be covered and not on the past loss experience.⁶⁷

Gross premium: This is the total premium charged to an insurance buyer. In this booklet it is stressed that microinsurance gross premium should be calculated to sufficiently cover *all* projected costs.

Incurred claims ratio: Total incurred claims cost divided by the earned premium in a given period.

Incurred expense ratio: Total incurred expenses divided by the earned premium in a given period. This can be subdivided into additive components such as an incurred operating expense ratio, incurred distribution expense ratio, and so on.

Independent risk events: Two risk events X and Y are said to be independent if the occurrence or non-occurrence of one of the events does not affect the probability of occurrence or non-occurrence of the other event.

Insurable risk: An insurance risk is one that meets the conditions described by the Core Insurance Principles (see box 2.1).

Lapse: The termination or discontinuance an insurance cover due to non-payment of due premium.

Law of Large Numbers: The statistical theorem which states that the greater the number of exposures (for example, lives insured), the more closely actual experience for a particular period will resemble the expected experience that would result from a near infinite number of exposures. Thus, as the number of people in the insured risk pool increases over several years, the variance in claims experience will reduce from year to year and approach the actuarially calculated expected experience (if the calculation is correct).

Moral hazard: In insurance, moral hazard refers to the change in behaviour of an insured in a way that usually raises costs for the insurer through increased possibility of loss or greater severity of loss. This happens since the insured no longer bears the full costs of a loss as he would were he not insured. For example, a person with auto insurance may drive with less caution since she no longer will bear full cost of damages if she were involved in an accident. Another example might include failing to properly care for an insured animal because it is insured, thereby increasing the chance it will die of disease.

⁶⁷ <http://www.irmi.com/online/insurance-glossary/terms/e/exposure-rating.aspx>

Net premium: In this technical guide, the net premium is defined as the *risk premium + security loading + other margins* (to compensate for possible errors in assumptions, usually). Note that net premium can have different definitions in different contexts. Where insurers use reinsurance, net premium often refers to gross premium less ceded reinsurance premium. *See also "Security margin"*.

Partner-agent model: A method used by organisations to deliver insurance. The insurer maintains the risk and contracts with a partner (agent) to deliver the product and/or administrative services to the target market.

Pre-existing condition: This is a physical and/or mental condition of an insured that first manifested itself prior to insurance coverage.

Pricing specialist: Person in charge of calculating the insurance premium if pricing is done internally, or in charge of reviewing and validating the insurance premium calculated by an external consultant if pricing functions are outsourced. Pricing specialists are either certified actuaries or other persons with a mathematical and statistical background.

Probability: Probability is a mathematical quantity representing the likelihood that an event will occur within a specified period of time.

Probability distribution: A probability distribution assigns a probability to each of the possible outcomes of a random experiment. To define probability distributions for the simplest cases, one needs to distinguish between discrete and continuous random variables. In the discrete case, one can assign a probability to each possible value: for example when throwing a balanced die, each of the six values 1 to 6 has the probability 1/6. For a continuous random variable x , probability is calculated by the definite integral on its probability density function between lower limit x_1 and an upper limit x_2 (i.e. $x_1 \leq x \leq x_2$).

Profit Margin: The profit margin is the portion of the gross premium allocated to the organization's profit.

Random fluctuations: The occurrence of insured random events do fluctuate naturally so that within a specified period of time the number of claims and amount of claims are naturally lower or higher than statistically calculated expected values. In general, the magnitude of random fluctuations decreases as the number of insured in a programme increases. As well, for a given programme, the smaller the probability of the insured events, the greater the magnitude of fluctuations. Increased magnitude of claims fluctuations for an insurance programme reflects increased uncertainty and thus requires greater security loadings.

Reinsurance: Reinsurance is insurance protection purchased from a reinsurer by an insurer. In insurance language, a portion of the assumed risk by the primary insurer is ceded (passed on) to the reinsurer. Often, it is not wise for an insurance programme to retain all of the risk it assumes since random fluctuations in claims, covariant events, or natural catastrophes could bankrupt a programme or even the primary insurer. Some types of reinsurance amount to a direct cession of a portion of the primary underwritten risk (also called co-insurance, risk-sharing, quota-share, or proportional reinsurance) or ceding individual risk amounts in excess of an individual risk retention limit (surplus or individual excess-of-loss). Other forms are additional protection without the reinsurer assuming any portion of the primary risk; an example is catastrophe reinsurance.

Risk classification: The process or system by which risks are classified for purposes of setting premium rates. For life insurance, for example, individual risks are classified according to age, occupation, sex, health status, geographic location of residence, and other parameters.

Risk factors: Risk factors are properties of insured units that make insurance claims more or less likely. For example age and health status are factors that are important for pricing life and disability insurance while microclimate, irrigation, and soil quality are determinants in setting agricultural insurance rates.

Risk exposure: A risk exposure is a unit of risk which may be defined in various ways but commonly in terms of duration and amount of insurance cover. For example, one could define a unit of risk exposure for a particular rating exercise as 1000 of insurance cover for exactly one year. Risk exposure also means the state of being at risk of loss due to exposure to hazardous conditions or random events.

Risk pooling: Generally this term refers to the fundamental insurance concept of consolidating (pooling) similar risks into a common fund (pool). To an insurer, a risk pool is a collection of insurance contracts with similar risk characteristics grouped together as one financial account. The term is also used to describe a fund that has been set up between two or more insurers for the purpose of reducing risk concentration amongst themselves. At a community level, a risk pool is a fund to which many contribute regularly in exchange for expected compensation for certain types of losses- in other words, it is a self-insured programme.

Risk premium: The portion of the gross premium that is used to fund claims and if calculated correctly it is equal to the expected claim amounts.

Security loading: See *security margin*.

Security margin: Also known as *security loading* or *uncertainty margin* or *risk loading* or *risk margin* or *loading for adverse deviations*, the security margin is a loading on the net premium which aims to take into consideration the random fluctuations in claim experience around the statistical mean. Occasionally the term is also used to describe extra loading to compensate for unpredictable differences between pricing assumptions and actual insurance outcomes however this loading is for an entirely different purpose.

Take-up rate: With voluntary insurance, the take-up rate is the percentage of potential customers who actually purchase the coverage.

Underwriting: A process of selecting risks for insurance and determining for what amounts and on what terms an insurance programme will accept the risk.

Waiting period: The length of time an insured must wait before his or her coverage becomes effective for covering a type of risk. Designed to control adverse selection for life insurance, for example, a waiting period reduces the risk that someone not in good health will purchase the insurance and die shortly after coverage takes effect. Commonly, life microinsurance plans cover accidental death from inception while cover for other causes of death is subject to a waiting period.

Willingness to pay: the willingness to pay (WTP) is the maximum amount a person would be willing to pay, sacrifice or exchange in order to receive a good or to avoid something undesired, such as pollution.

Appendix 1 - case studies

Health microinsurance in Asia

Context/target population

In 2006, the rural health care provider arm of a large multi-dimensional NGO in South Asia approached a newly created microinsurance agency seeking an innovative health care financing tool. The NGO supported primary care facilities and secondary care hospitals providing quality services in a remote mountainous area. Few members of the local population could afford to pay for hospitalization, and costly episodes of ill health impoverished families. The microinsurance agency and the insurance company that underwrote the agency's other existing (life) MI products partnered with the NGO, eager to prove that health microinsurance can help protect families against poverty.

The target population of about 350,000 was dedicated mostly to farming and animal husbandry. Average family income was estimated at US\$ 140 per month, although income patterns were cyclical and tied mostly to annual crop sales. The area was also served by government hospitals that were supposedly free of cost but were under-staffed, under-resourced, and overcrowded. Medicines and surgical supplies were often unavailable, and waiting times were frequently long. The average out-of-pocket cost of health care per person was around 1250 per year in local currency (approximately US\$ 20). Private health care services were available through the NGO's health care subsidiary at a significant subsidy; cost recovery from patients was only around 40%.

Product design

Supported by a donor funded initiative, prominent international consultants in health microinsurance were sent to the area to gather the necessary information. Through this research and their own findings, the microinsurance agency and its consultants identified a number of issues that impacted both the product design and the price:

- The health insurance product was intended to prevent families from further impoverishment caused by costly health care expenses, such as a caesarean section. Hospitalization was recognized as a proxy for an expensive health event, therefore the coverage was designed to cover hospitalizations rather than minor or recurrent expenses related to outpatient consultations or medicines.
- A reimbursement approach to claims payment would still force insured patients to raise the initial cash to pay the hospital bill, possibly by resorting to money lenders or selling assets. Therefore, the preferred approach for the product was a "cashless" payment system whereby the insurance claim was paid directly to the hospital. This had the added advantage of discouraging fraud among staff required to handle cash.
- The insurance product was designed to be sold as group insurance at the village level, and therefore the decision to purchase insurance was to be made by the village. Coverage needed to be extended to village elders, as excluding them would have threatened village level acceptance due to the influence of the elders.
- The partnering NGO's health care services had started with a strong focus on maternal and child health, and although it had evolved to offer basic and secondary health care for everyone, the image persisted. Excluding maternity benefits or children would have conflicted with the strong positive brand perception.
- Health insurance was unknown in the target market, therefore the product design was aimed at providing a first time experience that was convincing both in terms of simplicity, promoting insurance understanding and positive attitude in view of future renewals, and in terms of

addressing people’s risks comprehensively. The focus group discussions had also shown that people preferred a product without co-payments or deductibles.

The initial product design therefore included the following features.

Table A1.1: Product benefits and features

MAIN (SECONDARY) HEALTH CARE BENEFITS	<ul style="list-style-type: none"> • In-patient (overnight) hospitalization covering expenses up to 25,000 (in local currency, approximately US\$ 400) • One follow-up visit after hospital discharge • Drugs for treatment continuation after hospital discharge until follow-up visit
ADDITIONAL HEALTH CARE BENEFITS	<ul style="list-style-type: none"> • One voucher for out-patient consultation in network hospitals for every insured person
LIFE INSURANCE BENEFITS	<ul style="list-style-type: none"> • 25,000 of life insurance for the family’s main income earner if under age 60
LIMITED EXCLUSIONS	<ul style="list-style-type: none"> • Included maternity coverage (normal delivery + complications) • No waiting periods or co-payments • No exclusion of pre-existing conditions and very few other exclusions (exclusion included routine medical check-ups, infertility treatment, mental illness or psychiatric disorders, self-inflicted injury, alcohol or drug abuse)
ELIGIBILITY	<ul style="list-style-type: none"> • No age limit (in addition to the elderly, new-borns were insured as of birth free of cost) • “Semi-mandatory”: No individual underwriting, but insurance was only available if at least 50% of households of a village bought the insurance for the entire household
ADMINISTRATION OR PROCESS FEATURES	<ul style="list-style-type: none"> • Cashless in network hospitals • Enrolment possible once a year; 12 month coverage starting in November • Single annual premium due upfront, same premium payable for every insured

The initial design also included transportation costs for maternity cases and referral to top tertiary hospital in the capital – features that were later removed because the resulting premium conflicted with the willingness and ability to pay.

Prior research had shown that the biggest risks the target population faced were catastrophic health expenses and death of a family's breadwinner. Piggybacking on the logistics of the health microinsurance, it seemed straightforward to also add life insurance, providing important additional risk protection at marginal additional cost.

The outpatient voucher was intended to give a tangible benefit to everyone, assuming that 95% of insured would not be hospitalized in any given year. Early experience from other health microinsurance ventures showed that tangibility of insurance is a big issue while the target markets' appreciation of risk transfer matures. This voucher was not insurance but a pre-paid medical expense, designed to pass on the advantages of a bulk purchase discount from the provider to the insured. Coverage of some outpatient costs was also intended to promote early health seeking behaviour and address ailments before hospitalization was required.

Experience from other health microinsurance programs also seemed to indicate that an emphasis on hospitalization could result in inadequate follow up care after discharge if the corresponding cost was not covered by the insurance, ultimately leading to frequent relapse of hospital need and increased claims ratios. This reasoning was behind the decision to include coverage for drugs after discharge as well as the follow up visit.

Group insurance considerations

In order to apply the principles of group insurance, the insurance package was designed to be sold as group coverage at the village level. As the self-employed farmers did not belong to other obvious groups, the village was a natural existing group; however a village is not a legal entity. A proxy was therefore required, and found in the civil society organizations that the same NGO had established in the area over many years. Village and Women's Organizations (V/WO) had been created to facilitate self-help ventures, such as building bridges and irrigation systems, and were grouped under the umbrella of Local Support Organizations (LSO), all forming part of a Rural Support network. This Rural Support network agreed to partner in the distribution and enrolment of the villagers and provided the necessary trust of the local population. The insurance company issued group insurance policies to various LSOs on behalf of the villagers that were members of the affiliated V/WOs and had decided to insure their household – subject to the condition that 50% of the V/WO's member households chose to purchase insurance.

Calculating the risk premium

Average claims cost

There was abundant data on the average cost of hospitalizations of the target population at the network hospitals, who shared this data. Assumptions had to be made about the appropriateness of past hospital bill amounts to predict future insured hospital bill amounts; not just because of medical inflation but also because of changing behaviour of insured and providers. Average costs differed for the different facilities, so it had to be decided whether to price differently for the initial two hospitals or use one premium for all based on an assumed proportion of utilization of each hospital.

It appeared that the hospital capacity had been underutilized in previous years; hence the operating cost per patient was comparatively high. It was expected that insurance would lead to higher utilization and a subsequent reduction in required cost margin. The hospitals agreed to reflect that with discounts in their tariffs. In view of the target population's ability to pay premium, the hospitals also agreed on

predetermined treatment protocols for many common illnesses and the preferential use of generic drugs. In addition, the agency decided to place gate-keepers at the network hospitals to assess the need for hospitalization.

Considering all this and based on the available information, it was possible to determine the expected average cost of an insured hospitalization assuming 15% annual inflation. Two hospitals (and their corresponding catchment areas) were chosen for the pilot, and a 50/50 split of utilization was assumed. Based on the above, the expected average claims cost was as follows:

Figure A1.1: Expected average claims cost

Expected Average Claims Cost (in local currency)	Hospital 1	Hospital 2
Non-maternity hospitalisations	3,601	2,910
Normal delivery hospitalisations	2,043	1,651
Caesarean sections	14,665	11,852

Incidence rates

There was no useful data on hospitalization incidence; the NGO's hospitals could provide data on past hospitalizations but many people were expected to have used other hospitals (particularly the government hospitals, and no data was available from there), have used traditional healers or have postponed treatment. The actuarial consultants decided that the best estimation could be found in using experience data from a health microinsurance scheme that had been in place in neighbouring India for some years and served a comparable population. Many adjustments had to be made to account for different household size/age composition, the proportion of women of childbearing age and local birth rates, different maximum benefit limits, and the fact that the Indian scheme was voluntary.

The following table illustrates some of the adjustments that were made. The family composition assumptions were determined based on a household survey that had been conducted in the region as part of the initial analysis.

Figure A1.2 Incidence assumptions

Member of Household	# of people (from household survey)	Assumed Ages	Assumed Incidence Rate (from Indian scheme)	Total Incidence per category
Head of household (male)	1	40	4.70%	0.047
Spouse (female)	1	38	4.70%	0.047
Son/Daughter	5	2,4,6,8,10,15 (that's 6)	2.30%	0.115
Son/Daughter in Law	2	20,23	4.70%	0.094
Grand Children	2	1,3	2.30%	0.046
Brother/Sisters	0.33	15	4.70%	0.016
Parents	0.15	58	9.40%	0.014
Grand Parents	0.01	75	14.10%	0.001
Other Relatives	0.31	15	9.40%	0.029
Totals	11.8			0.409
Average hospitalization incidence rate per household member				3.47%

Additional assumptions included:

- Family households include at least 2 women of childbearing age
- An average birth rate of 3% among women of childbearing age
- An average rate of 16% for Caesarean sections (as a % of the birth rate)

The final proposed incidence rates were 3.6% for non-maternity related hospitalizations, 1.9% for normal delivery hospitalizations and 0.33% for hospitalizations requiring a caesarean section.

The average annual mortality rate was assumed to be 3.6 per 1000. Note that the life insurance premium was charged to every insured although only one person per household was insured.

Total premium calculation

After negotiating the remuneration for the intermediating LSOs and the agency, the pricing (in local currency) for the first hospital looked as follows:

Figure A1.3 Total premium calculation

HOSPITAL 1	Expected incidence in total population		Expected average cost	Premium
Hospitalisation	non-maternity related	3.60%	3'601	130
Hospitalisation	Caesarean Section	0.33%	14'665	48
Hospitalisation	normal delivery	1.87%	2'043	38
Sub-Total Health				216
Life Assurance		0.03%	25'000	7
Net Risk Premium				223
Agency remuneration (25%) including 10 for LSO				83
Insurer admin charge (7.5%)				25
Gross Premium				330
Outpatient voucher				50
Total Premium				380

A similar calculation for the second hospital resulted in a premium of 320, and as a 50/50 split of utilization was assumed, the premium was set at 350 per person per year for everyone (approximately US\$ 5.60).

Reinsurance

The insurance company underwriting the scheme had no reinsurance for its health insurance business. To address worries about possible claims trends, the agency arranged a Stop Loss reinsurance treaty that covered 90% of the claims in excess of premiums up to a threshold. This was possible only because the agency had good relationships with a major reinsurer who was interested in the claims data that would be generated. The decisive element was that the agency arranged to reimburse the reinsurer for any losses, thereby effectively carrying the risk through a complex structure that was more tax efficient than reimbursing the insurer directly, and only possible because the agency succeeded in mobilizing investor money for this purpose.

This was a unique feature of the programme that allowed the agency to make product design and pricing decisions with relative autonomy at the local level, somewhat increasing the sense of ownership of local stakeholders (the insurance company was domiciled far away down country).

Calculating the gross premium

Apart from commissioning the market research and product design, the microinsurance agency also arranged the distribution, enrolment and premium collection logistics. In addition, the agency committed to provide the gate-keeping and hospital case management, pre-approve claims, train all local partners, produce marketing material, provide smart cards with individual photographs to every insured as well as provide all the necessary hardware and software for patient authentication at the hospital.

The agency also provided a small comfort deposit to the insurer to assuage worries about insufficient pricing while the reinsurance solution described above was arranged.

Cost for the services to be provided locally was estimated to be around 2.5 million (in local currency, approximately US\$ 40,000) for salaries, office rent, transportation etc. per year. Part of the work was done at the NGO's head office and financed by grant funding, therefore this part of the cost was not included in the estimated 2.5 million. At the expected 15,000 insured persons during the first year pilot, the agency's remuneration would obviously not cover the anticipated expenses, but steep growth was projected for subsequent years (45,000 persons in second year growing to 100,000 after three years in an ever larger territory).

The administration charge of 7.5% for the insurer was meant to cover their back office expenses.

The agency's remuneration was also determined by the agency contract it had with the insurer which fixed agency income at 25% of gross premium for health microinsurance. This agreement had been put in place before the microinsurance product was finalized and was not further negotiable – the assumption was that it was up to agency to make ends meet via cost efficiency and scale.

The consultants commented that for an efficiently administered scheme with adequate community participation the total expense margin should be in the range of 15 – 20%. However, they concurred that the higher expense margin assumed (25%) was not inappropriate for a new scheme.

A proper business plan was not done to assess the robustness of the pricing or the expense loading assumptions. Similarly, no scenario analysis was performed to evaluate the projected financial results. No explicit contingency or safety margin was included. Moreover, the actuarial consultants assumed that implicit margins were included as a result of using the average of a best estimate pricing and a conservative pricing, the difference being how they adjusted the data to account for the differences in cover between the new programme and the reference microinsurance scheme in the neighbouring country. Neither the insurer nor the agency or the distributing LSOs or the hospitals had any profit expectation from this insurance, and aimed only at covering their cost. Therefore, no profit margin was included.

Willingness to pay

The initial research that was conducted prior to the product development stage included research on willingness to pay and health financing needs, conducted by a national university, and involved focus group discussions with 250 individuals in 10 locations.

When offered a hypothetical choice among 4 products, 75% of respondents stated they would buy a combined product offering hospitalization and life insurance for a premium of 375 per year (US\$6) per person.

The consultant's review of the final gross pricing commented that the market was very price-sensitive for a number of reasons, for example because the product required the entire household to join the scheme. While this requirement was introduced to discourage anti-selection, it also greatly increased the entry price.

Pilot launch – first year

In September and October 2007, the insurance was sold through three Local Support Organizations (LSOs) and their member Village and Women's Organizations (V/WOs) to 1,700 families adding up to 6,000 individuals, achieving only 40% of target. 23 out of 40 V/WOs qualified for insurance, on average exceeding the 50% hurdle only by 8%.

The main reasons for these results identified at the time include:

- The projections were based on households, but the insurance was purchased on the basis of families. Households were organized around a compound with extended families, that is, several nuclear families living in one household. People bought the insurance on a nuclear family basis, possibly because the life insurance covered only one designated bread winner. (The conceptual confusion between family and household continued to be a challenge for the project.)
- Enrolled families were smaller than expected, most likely because smaller families could more easily afford the insurance and migration had not been appropriately considered (related to work and children's higher education).

- The LSOs and V/WOs did not perform their communication, distribution and enrolment duties as expected; their ability and willingness to embrace the innovation had been overestimated, and their financial remuneration was not a strong motivator.
- It turned out that some people in the catchment area already had health insurance provided by the military to the families of the numerous army personnel in the area, and hence didn't need health microinsurance.

Figure A1.4 Family size

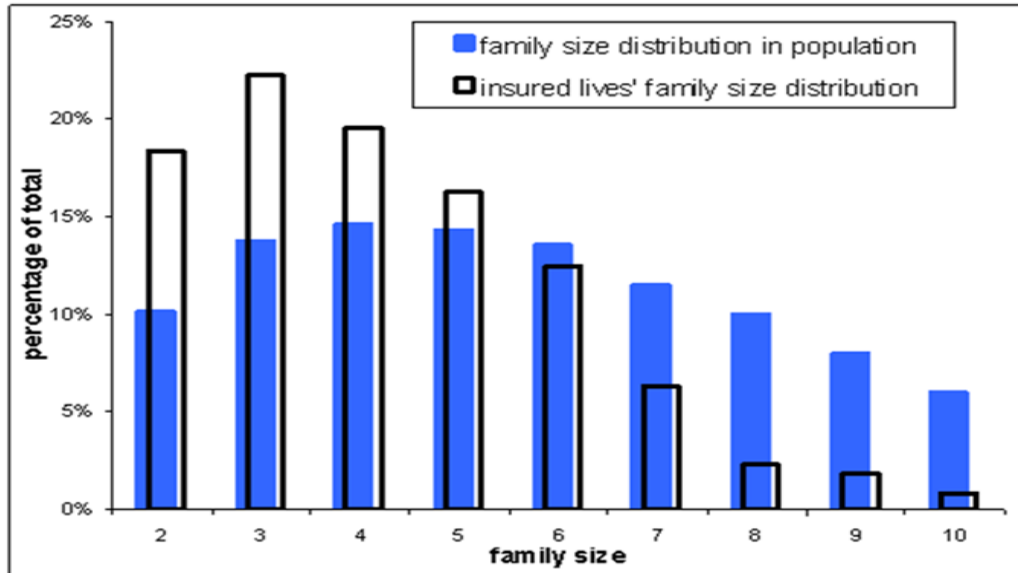


Figure A1.5: Insured age distribution

age distribution: from - to years							
0-10	11-20	21-30	31-40	41-50	51-60	61-70	71+
22%	15%	17%	17%	11%	9%	6%	3%

Claims reporting

The first claims report looked as follows (in local currency):

Figure A1.6: First claims report

Patient Name	Date of Birth	Gender	Relationship to Head of	VO/W O	Nature of claim CL/RB	Hospital Name	Admission Date	Discharge Date	Length of Stay (Days)	Final Diagnosis	Duration of Illness	Opening Balance	Billed Amount	Approved Amount	
XYZ	2-Apr-53	M	SELF	1234	Insured	ABCD	27/11/2007	29/11/2007	3	HEART ATTACK		25'000	5'221	5'221	
												Insurance Paid Amc			5'221
												Closing Balance			19'779
ABC	3-Sep-05	M	SON	1234	Insured	ABCD	23/11/2007	24/11/2007	1	ACCIDENT		25'000	482	482	
												Insurance Paid Amc			482
												Closing Balance			24'518
LMN	9-Dec-80	F	WIFE	1234	Insured	ABCD	27/11/2007	28/11/2007	1	FULL TERM PREGNENCY		25'000	1'742	1'742	
												Insurance Paid Amc			1'742
												Closing Balance			23'258
DEF	12.06.1932	M	SELF	1234	Insured	ABCD	11.07.2007	11.12.2007	6	COPD		25'000	12239	12239	
												Insurance Paid Amc			9'742
												Closing Balance			15'258
						ABCD	13/11/07	16/11/07	3	COPD		Insurance Paid Amc			2'497
						Closing Balance	12'761								

This was the transfer to Excel of a pdf output from the claims software that had been bought from an African health microinsurance provider, and it proved useless for analysis due to the inconsistent arrangement and formatting of the data, including inconsistent spelling of diseases that made filtering impossible. At that point, no actuary or pricing specialist had been involved in the reporting and data structuring.

Adjusting the output of the claims software to a format that could be analysed in Excel took a year (and the use of the claims software was discontinued after that year due to license fee disagreements and disappointing experience). In the meantime, claims had to also be recorded manually in Excel to allow for monitoring and analysis.

To facilitate this, the immediate recommendation made by the resident actuary who joined the project in December 2007 was to use an Excel template that used pre-established formatting and drop-down menus for consistent spelling, for example:

Figure A1.7: New Excel claims template

A	B	C	D	E	F	G	H	I	J
Serial No.	Household Enrollment No.	Patient Name	Date of Birth	Gender	Relation ship to Head of H'hd	VO/WO	Claim Source	Hospital Name	Admission Date
1	1234567	XX YY	17 June 1986	M	SON	FGHI	Hospital	ABCD	12 November 2007

K	L	M	N	O	P	Q	R	S
Discharge Date	Length of Stay (Days)	Final Diagnosis	Opening Balance	Paid Amount	Closing Balance	Billed Amount	Approved Amount	Pre-existing condition?
14 November 2008	368	LSCS	25,000	3,000	22,000	3,300	3,000	NO

By mid-2008, this template allowed some claims analysis (in local currency):

Figure A1.8: Claims experience in first six months

RURAL HEALTH MICROINSURANCE SCHEME - EARLY CLAIMS EXPERIENCE	claims number	actual to expected	monthly incidence in %	annual projected incidence in %	average claim size	total claims cost	monthly actual to expected	OPD vouchers used
November	32	110%	0.53%	6%	4'229	135'342	124%	156
December	62	212%	1.03%	12%	4'104	254'430	234%	241
January	69	236%	1.14%	14%	3'266	225'340	207%	312
first quarter experience	163		0.90%	11%	3'774	615'112		709
assumed	88		0.48%	6%	3'729	326'829		
actual to expected	186%		186%	186%	101%	188%		
February	60	205%	0.99%	12%	3'656	219'385	201%	161
March	68	233%	1.13%	14%	4'054	275'684	253%	173
April	49	168%	0.81%	10%	3'030	148'474	136%	205
second quarter experience	177		0.98%	12%	3'636	643'543		539
first half experience	340		0.94%	11%	3'702	1'258'655		1'248
assumed	175		0%	6%	3'731	653'934		
actual to expected	194%		194%	194%	97%	192%		

Figure A1.9: Year one claims experience

Incidence Rate	all	male	female
Number of Claims	765	229	536
Exposure	6'044	2'766	3'278
Actual Annual Incidence Rate	12.7%	8.3%	16.4%
Expected Annual Incidence Rate	5.8%	3.6%	8.1%
Actual/Expected	217.1%	230.0%	202.9%

Figure A1.10: Average claim costs after year one

Average Claim Cost	all	male	female	Hospital 1	Hospital 2
Total Claim	3'668	3'977	3'536	2'203	5'388
Medicine Claim	1'204	1'525	1'066	1'096	1'329
Surgical Procedure(s) Claim	1'102	884	1'195	259	2'092
Surgical Supplies Claim	387	358	400	179	632
Bed Claim	473	517	454	262	720
Consultation(s) (Inpatient) Claim	211	266	187	190	235
Lab Test(s) Claim	290	421	234	213	380
Cost Per Day	1'761	1'851	1'722	1'435	2'144
Length of Stay		3	2	2	3
Highest claim	25'000	25'000	22'878	12'239	25'000
Expected Average	3'372				
Observed/Expected	109%				

Figure A1.11: Claims analysis by age bands

Age Distribution		all		male		female	
From Age	To Age	Incidence Rate	Average Claim Cost	Incidence Rate	Average Claim Cost	Incidence Rate	Average Claim Cost
0	10	17.99%	2'952	14.38%	3'323	22.08%	2'679
11	20	4.38%	3'774	2.82%	3'314	5.73%	3'971
21	30	15.30%	3'921	2.63%	5'277	21.71%	3'838
31	40	12.95%	3'593	4.66%	2'449	20.22%	3'824
41	50	5.09%	4'150	2.58%	2'504	6.91%	4'593
51	60	10.70%	3'903	8.09%	5'094	12.96%	3'262
61	70	13.02%	4'405	15.13%	4'185	11.16%	4'666
71	80	52.89%	6'338	48.00%	8'414	59.81%	3'985
81	90	9.92%	4'780	16.94%	4'780	0.00%	-
91	100	3.31%	2'012	2.82%	2'895	3.99%	1'130
101	110	42.98%	2'914	28.23%	3'696	63.80%	2'426

Figure A1.12: Monthly claims analysis

Month by month evolution		all		male		female	
From Date	To Date	Incidence Rate (Annual Projection)	Average Claim Cost	Incidence Rate (Annual Projection)	Average Claim Cost	Incidence Rate (Annual Projection)	Average Claim Cost
01.11.2007	30.11.2007	6.26%	4'245	5.29%	5'970	7.07%	3'156
01.12.2007	31.12.2007	11.92%	4'133	7.68%	4'987	15.49%	3'775
01.01.2008	31.01.2008	13.28%	3'492	8.11%	3'589	17.65%	3'455
01.02.2008	29.02.2008	11.69%	3'979	8.21%	3'955	14.63%	3'990
01.03.2008	31.03.2008	14.65%	4'191	8.54%	3'978	19.81%	4'269
01.04.2008	30.04.2008	10.70%	3'569	8.38%	4'001	12.65%	3'327
01.05.2008	31.05.2008	13.28%	4'438	6.83%	7'681	18.73%	3'441
01.06.2008	30.06.2008	13.52%	2'931	6.17%	2'520	19.73%	3'040
01.07.2008	31.07.2008	17.58%	2'913	11.10%	2'243	23.05%	3'185
01.08.2008	31.08.2008	16.99%	2'967	14.94%	2'488	18.73%	3'290
01.09.2008	30.09.2008	11.51%	4'077	8.38%	5'452	14.14%	3'389
01.10.2008	31.10.2008	10.16%	3'998	5.55%	3'637	14.05%	4'119

Figure A1.13: Claims analysis by gender and disease

Top Ten Conditions/Diseases	all		male		female	
Rank	Condition/Disease	Aggregate Claim Cost	Condition/Disease	Aggregate Claim Cost	Condition/Disease	Aggregate Claim Cost
1	Other	558'520	Other	216'079	LSCS	391'238
2	LSCS	391'238	HTN	99'191	Other	342'441
3	SVD	342'285	Hernia	94'246	SVD	336'685
4	HTN	199'967	Fracture	85'094	HTN	100'775
5	IHD	141'668	IHD	74'230	IHD	67'438
6	Fracture	124'750	Gastroenteritis	42'750	Gastroenteritis	53'153
7	Hernia	113'901	COPD	40'090	Appendicitis	49'799
8	Gastroenteritis	95'903	Pneumonia	39'252	Infection-UTI	48'590
9	Infection-Acute febrile illness	80'301	Infection-Acute febrile illness	32'241	Infection-Acute febrile illness	48'060
10	Pneumonia	71'728	Kidney disorder	25'000	D&C	45'661

LSCS = lower section caesarean section

SVD = standard vaginal delivery

HTN = hypertension

COPD = chronic obstructive pulmonary disease

IHD = ischaemic heart disease

UTI = urinary tract infection

Year two: product and pricing changes

The much higher than expected number of claims resulted in a loss ratio of 240% of net premium, and although the statistical significance for future projections was questioned due to the small number of insured lives (and the money lost was not excessive), action was urgently required to reduce the loss ratio. The most obvious proposal was to increase premium accordingly, that is at least double it. But in view of the willingness and ability to pay of the target population, it was felt that this would impact demand so massively that only a few wealthier individuals would buy it – and those in real need to make use of the insurance. Although there was no guaranteed renewability, the anti-selection spiral was menacing.

Another proposal was to remove the overly generous elements of the cover, primarily maternity. Again, the counterargument was that this would attract less rather than more people and conflict with the provider’s maternity brand while exposing people to one frequent reason of impoverishment. In general, there was considerable resistance to change on the part of the local partners: it had taken considerable effort to train and create understanding among local stakeholders and target customers; marketing material had been printed, and the sales speech script had become a habit. It was felt that too much change would confuse and deter clients.

Eventually, the following changes were agreed to be implemented in 2008:

Figure A1.14: Year two product changes

change	purpose
Increase of premium from 350 to 400	insurer insisted to teach customers that premiums of health insurance invariably increase every year
Addition of new distributing LSOs in new geographic areas	reach out to larger populations, expand risk pool, generate more revenue
Addition of two more secondary health centres	service insured population in new areas
Addition of 24 primary care facilities	address simple episodes (normal delivery, respiratory and digestive infections) at lower cost
Increase of the maximum benefit limit from 25,000 to 30,000 for renewing individuals	reward and encourage loyalty
Inclusion of ante- and postnatal care	reduce the likelihood of delivery complications thus reducing the cost of hospitalisations
Abandon use of smart cards with photographs	end of unsatisfactory use of African system and no computers / connectivity at newly added facilities

Outreach was expanded to new geographical areas by extending the partnership to more LSOs that represented more V/WOs, and efforts renewed to train and motivate them.

19,500 individuals from 5,300 families bought insurance for the period Nov08 to Oct09. Of the families who bought in the first year, 45% of them renewed.

In the second quarter of 2009, 400 individuals were interviewed to find out what they liked and disliked about the insurance, why they bought it and renewed or did not renew, how they had funded the premium and how satisfied they were with product and service.

Year two: claims experience

The implemented changes were not enough to reduce the losses (in local currency):

Figure A1:15 Year two incidence rates

Incidence Rate	first year	second year
Number of Claims	765	3'433
Exposure	6'044	19'501
Actual Annual Incidence Rate	12.7%	17.6%
Expected Annual Incidence Rate	5.8%	5.8%
Actual/Expected	217.1%	301.9%

Figure A1.16: Year two average claims cost

Average Claim Cost	full policy year 2008	full policy year 2009	change in %
Total Claim	3'668	4'445	121%
Medicine Claim	1'204	1'791	149%
Surgical Procedure(s) Claim	1'102	1'189	108%
Bed Claim	473	463	98%
Consultation(s) (Inpatient) Claim	211	216	102%
Lab Test(s) Claim	290	458	158%
Other Misc. Claim	2	244	12057%
Length of Stay	2.4	2.1	86%
Cost Per Day	1'510	1'697	112%

Family life, credit life, health microinsurance in Vietnam

Context/background

This case highlights the experience of an MFI in Vietnam which set up its own microinsurance institution. The MFI's core business is microfinance, based on the Grameen methodology but adapted to the Vietnam context. With 20 branches (as of 2008), it operates primarily in agriculture-based communities within the poorest districts and communes in the northern Vietnam provinces, providing loans to women of rural poor households already engaged in small business. The MFI members are comprised primarily of women living in poor households earning less than VND 100,000 (US\$ 4.80) a month. To be eligible for loans, clients have to be between the ages of 18-55 and be in good physical condition for carrying out income-generating activities.

In 1996, the MFI decided to provide additional financial services to its members by adding an insurance component. The coverage included a basic funeral expense benefit payable in the case of premature death of the member, spouse or child, as well as credit life protection in case of premature death of the member. A benefit in case of hospitalization due to major illness or surgery was added later. Premiums were collected in combination with the weekly loan repayments and savings deposits.

In 2007, the MFI took the strategic decision to separate its microinsurance activities from the microfinance business and to create a separate microinsurance institution called Mutual Benefit Fund (MBF) in this appendix. The proposal for the new entity included hiring a dedicated team and creating appropriate accounting and MIS, as well as an objective to become registered under existing mutual

insurance regulations. Registration requires a minimum capital of 10,000,000,000 VND (US\$ 480,000) at the time. An upgraded product offering was also planned.

The following steps were undertaken to achieve these objectives:

- A market research study was conducted to confirm the insurance preferences of the members and to estimate the contribution amounts that they could afford and were willing to pay for the upgraded benefits and services.
- A new product was designed and priced, and corresponding financial projections were prepared.
- A pilot was conducted in one of the MFI's branches to validate the new product offer.

Product design

The market research confirmed the interest of the members for life and health coverage as well as weekly savings. Based on this research, as well as the objective for the new microinsurance subsidiary to increase its capital to the required minimum over a four year period, the consultants designed a new product with significant member contributions to build both individual member savings as well as the organization's capital. In 2008, after piloting for 3 months, they realized that the research conclusions were flawed and that members did not support the weekly savings at the time. The member savings component was dropped and a full rollout was made without further problems.

The final product included the following features and premium levels:

Table A1.2: Product benefits and features (family life and health only)

MEMBER DEATH BENEFITS	<ul style="list-style-type: none"> • The full benefit is VND 3,000,000 • New members are eligible for only 25% in the first year, and 75% in the second year • Benefits reduce to 50% if age at death is 65 or older
SPOUSE DEATH BENEFITS	<ul style="list-style-type: none"> • The full benefit is VND 1,000,000 • New members are eligible for only 25% in the first year, and 75% in the second year • Benefits reduce to 50% if age at death is 65 or older
CHILD DEATH BENEFITS	<ul style="list-style-type: none"> • Identical to spouse death benefits
MEMBER HOSPITALIZATION ASSISTANCE	<ul style="list-style-type: none"> • The full benefit is VND 1,000,000 • New members are eligible for only 25% in the first year, and 75% in the second year • Benefits reduce to 50% if age at death is 65 or older • Members can only claim once every five (5) years
ELIGIBILITY	<ul style="list-style-type: none"> • All MFI members are eligible. • Entry age: 18-55 • Exit Age: none
PREMIUM AMOUNTS	<ul style="list-style-type: none"> • Funeral cover – Member, Spouse + up to 3 children: 400 VND per week • Hospitalization - Member only: 600 VND per week • Separate single premium for credit life (loan protection): the annual premium rate is 0.40% of the outstanding loan amount at the beginning of the year
CONTRIBUTION TO CAPITAL	<ul style="list-style-type: none"> • In the first 100 weeks of membership, mandatory contribution of 1000 per week in MBP capital • Capital is refundable on withdrawal from the MBP

PENSION CONTRIBUTIONS	<ul style="list-style-type: none"> • 1000 per week mandatory pension savings beginning in the 101st week (once the capital contributions have been completed) • Voluntary additional savings allowed
TOTAL WEEKLY CONTRIBUTION	<ul style="list-style-type: none"> • 2000 per week, plus a separate single premium for credit life coverage
COMMISSION / ADMIN FEE TO MFI	<ul style="list-style-type: none"> • 12% of the weekly premium and pension contributions • 12% of credit life premium • 0% on the member capital contributions

Credit life coverage was equal to a member's issued loan amount and remains level throughout the coverage term at a cost of 0.4% of the loan amount per annum.

Data collection

An actuarial consultant was employed to price the product and build the corresponding financial projections. The consultant collected and analyzed the following data:

- Information on current MFI membership
- Claims history based on previous product
- 2005 WHO mortality table, Vietnam
- 2002 National Health survey
- MFI business plan
- Market research results

Table A1.3: Portfolio information, based on current MFI membership

Age Band	Age profile of members when they joined the MFI		Proportion of members with spouses		No of dependent children
	Sample count	% of sample	Sample count	% in age band	# of children / member
16-19	339	1.33%	14	77.78%	0.56
20-24	2109	8.26%	618	95.08%	1.02
25-29	3519	13.79%	1980	96.44%	1.49
30-34	4016	15.74%	3212	95.88%	1.93
35-39	4352	17.05%	3408	94.17%	2.12
40-44	4235	16.59%	3629	91.34%	1.87
45-49	3482	13.64%	4136	88.87%	1.45
50-54	2166	8.49%	3147	83.56%	1.06
55-59	960	3.76%	1760	79.42%	0.85
60-64	262	1.03%	678	74.75%	0.74
65-69	71	0.28%	188	69.63%	0.73
70-74	8	0.03%	51	64.56%	0.65
75+	2	0.01%	14	50.00%	0.39
	25,521		22,835	89.3%	

Data adjustments and notes

- The MBP launch date was assumed to be July 2008.
- All members were assumed to be female (MFI policy)

- 5-year age bands were used in order to produce a smoother result. Most branches provided only the members' year of birth, hence for consistency the birthday of all members was assumed to be July 1.
- The information on spouses and dependent children was assumed to be current. The year of birth of spouses was also provided however it seemed inconsistent and unreliable.
- While the MFI has a maximum entry age, almost 4 percent of members joined after attaining the maximum entry age of 55 (in this sample, 1001 of 25,521 were age 56 or older at entry). It was unclear if this was a result of coding errors or a lax implementation of the maximum entry age policy. In the projections, the latter was assumed and these members were still included in the age profile of future new members.
- The data included only current members; information on prior members who had dropped out of the programme or died was not maintained on the system and therefore was not available.

Table A1.4: Membership and claims history

Year	End of year membership (EOYM)	New members	Death of member	Member hospitalization assistance	Death of spouse	Death of child
2000	11,440	2,654	n/a	n/a	n/a	n/a
2001	13,112	2,944	n/a	n/a	n/a	n/a
2002	16,329	4,509	16	190	63	44
2003	18,911	4,241	32	146	89	41
2004	19,691	2,923	16	143	91	51
2005	21,303	3,516	29	138	116	43
2006	22,479	3,545	28	142	150	43
2007	25,540	4,734	22	133	115	40
Total			143	892	624	262

Table A1.6: WHO mortality table, 2005, Vietnam

Age range	nq_x / all	nq_x / male	nq_x / female
<1	0.01597	0.01663	0.01527
1-4	0.00304	0.00317	0.00291
5-9	0.00201	0.00216	0.00186
10-14	0.00189	0.00211	0.00166
15-19	0.00437	0.00568	0.00302
20-24	0.00589	0.00808	0.00367
25-29	0.00630	0.00835	0.00422
30-34	0.00772	0.00989	0.00558
35-39	0.01064	0.01323	0.00811
40-44	0.01583	0.01951	0.01225
45-49	0.02421	0.02995	0.01861
50-54	0.03722	0.04668	0.02801
55-59	0.05618	0.07146	0.04148

Age range	${}_nq_x$ / all	${}_nq_x$ / male	${}_nq_x$ / female
60-64	0.08682	0.11001	0.06458
65-69	0.13177	0.16395	0.10133
70-74	0.20314	0.24367	0.16582
75-79	0.30788	0.35382	0.26699
80-84	0.45814	0.50394	0.41922
85-89	0.63535	0.67498	0.60418
90-94	0.76025	0.78579	0.74271
95-99	0.83505	0.84914	0.82735

Table A1.7: Hospitalization rate (2002 Vietnam health survey)

Risk Factor	Risk Class	Annual Hospitalisation Rate
Gender	Male	4.6%
	Female	6.2%
Age	0-5	6.4%
	6-14	2.6%
	15-24	4.9%
	25-34	6.3%
	35-44	5.1%
	45-54	5.7%
	55-64	8%
	65+	10.8%

Calculating the risk premium

Incidence rates from past experience

Using the membership and claims data collected, the following average incidence rates were calculated. Note that child and spouse incidence rates are calculated based on the member exposure (as the premiums are paid per member rather than per insured).

Table A1.8: Incidence rates - past experience

Year	Member exposure*	Mortality Incidence			Hospitalization Incidence
		Member	Spouse	Child	Member
2002	14,729	0.11%	0.43%	0.30%	1.29%
2003	17,636	0.18%	0.50%	0.23%	0.83%
2004	19,309	0.08%	0.47%	0.26%	0.74%
2005	20,512	0.14%	0.57%	0.21%	0.67%
2006	21,905	0.13%	0.68%	0.20%	0.65%
2007	24,021	0.09%	0.48%	0.17%	0.55%
Total/Average	118,111	0.12%	0.53%	0.22%	0.76%

* *Exposure is calculated assuming new entrants and drop outs contribute an average of 0.5 years of exposure, whereas deaths contribute a full year of exposure in the year of death*

Discussion with the front line staff of the MFI pointed to some issues that affected the interpretation of the experience data:

- Age specific rates could not be calculated as data on deceased or withdrawn members is not retained.
- Some branches are allowing members to enrol siblings or older children as proxy spouses in order to avail of the spouse death benefits.
- Eligibility is based on the health of the member, who must be in good health to access a loan, and not on the spouse or children.
- The previous version of the product allowed the member to claim for hospitalization benefits only once per lifetime (the new version allows once every 5 years).
- There have been inconsistent interpretations of what it means to qualify for hospitalization assistance benefits. In April 2003 the definition for sickness was redefined as follows: “Serious illness means in hospital for a ‘long time’ due to fatal diseases. The medical record must be filed and certified by the hospital (official seal of the hospital).” Even with this definition there continued to be inconsistent implementation.
- Applying the hospitalization rates from the 2002 Health Survey to the MFI age profile distribution results in an average incidence rate of 7.36%.

Given the challenges with the data, the consultant adjusted the experience data by referencing both the WHO mortality table data and the 2002 Health Survey data. By combining the experience data with the more detailed incidence information available from external sources, the consultant was able to derive age and gender-specific incidence rates to use in the pricing model. The pricing model used a monthly survivorship approach to project expected claims, lapses, reinstatements and withdrawals, and the expected claims were projected based on the adjusted age and gender-specific incidence rates as applied to the projected membership demographics.

The *average* annual incidence rates that approximate the resulting pricing model projections are as follows:

- Member mortality rate: 0.14%
- Spouse mortality rate: 0.58%
- Child mortality rate: 0.26%
- Hospitalization incidence: 2.00%

Claims costs

For credit life, the outstanding amount of a loan was paid on behalf of the client. The remaining amount of the benefit was paid to the designated beneficiaries.

The insured benefits are fixed amounts, as shown below, with reductions in the first two years and after 65:

- Death of member VND 3,000,000
- Death of spouse/child VND 1,000,000
- Member Hospitalization VND 1,000,000

Risk premium calculation

Funeral expenses and hospitalization benefit

While the final premium calculations were performed and validated using a pricing projection model, the average required risk premium can be approximated as follows:

Table A1.9: Estimated risk premium

Benefit	Assumed Incidence	Benefit Amount*	Expected annual claims cost
Death of Member	0.14%	3,000,000	4,200
Death of Spouse	0.58%	1,000,000	5,800
Death of Child	0.26%	1,000,000	2,600
Member Hospitalisation	2.00%	1,000,000	20,000
Total annual premium (net)			32,600
Total weekly premium (net)			627

* Actual benefit amounts are lower during the first 2 years of membership and for members over 65.

Credit life

The credit life premium rates were calculated from the mortality experience on the credit life book over the projection period of the model. The projected loan portfolio for modelling the credit life product was taken from the MFI's business plan. A level rate was calculated as follows:

- $APR = PACR \times (1 + SL) / (1 - \text{expenses} - \text{commission} - \text{profit})$

Where:

- APR = Annual Premium Rate expressed as a percentage of the original loan amount.
- PACR = projected annual claims rate = projected claims incidence rate x coverage amount. For decreasing coverage, this requires adjustment using some additional assumptions.
- SL = Security loading: 15% of PACR
- Operating Expenses: 20% of gross premium
- Commissions: 12% of gross premium
- Profit loading: 10% of gross premium

In order to build up additional surplus for the organization, the calculated gross premium rate for level credit life coverage was rounded up to **0.40%**. This rate included a significant margin in excess of the required security loading and profit margins. The total (single) premium for a loan is then calculated as follows:

- Single Premium = 0.40% x Loan Amount x (Term of the loan in months / 12)

Calculating the gross premium

Commissions

The MFI received a commission/administration fee of 12% of the gross premium received, excluding the member contributions to the capital fund.

Operating expenses

The projected expense schedule for operating the microinsurance programme was prepared by the microinsurance organization's accountant, based on past experience (which was not made available to the consultant):

Table A1.10: Projected operating expenses

	2008 Jul-Dec Projected	2009 Projected	2010 Projected	2011 Projected	2012 Projected
Staff cost	85,568,240	243,456,000	292,147,000	467,435,000	560,962,000
Total salary and benefit (allowance)	81,272,000	230,400,000	276,480,000	442,368,000	530,842,000
Insurance	4,296,240	13,056,000	15,667,000	25,067,000	30,120,000
Admin cost	85,000,000	206,960,000	269,048,000	349,762,400	454,691,120
Office supplies	3,000,000	7,800,000	10,140,000	13,182,000	17,136,600
Transport	24,000,000	62,400,000	81,120,000	105,456,000	137,092,800
Training	15,000,000	39,000,000	50,700,000	65,910,000	85,683,000
Conference	12,000,000	15,600,000	20,280,000	26,364,000	34,273,200
Postage and telephone charge	8,000,000	23,400,000	30,420,000	39,546,000	51,409,800
Materials & newspapers	7,500,000	19,500,000	25,350,000	32,955,000	42,841,500
Other admin cost	15,500,000	39,260,000	51,038,000	66,349,400	86,254,220
Power, water, cleaning	2,500,000	5,460,000	7,098,000	9,227,400	11,995,620
Renting	12,000,000	31,200,000	40,560,000	52,728,000	68,546,400
Others	1,000,000	2,600,000	3,380,000	4,394,000	5,712,200
Asset cost	18,100,000	57,460,000	74,698,000	97,107,400	126,239,620

	2008 Jul-Dec Projected	2009 Projected	2010 Projected	2011 Projected	2012 Projected
Fixed asset depreciation	10,000,000	36,400,000	47,320,000	61,516,000	79,970,800
Maintenance & Repair	600,000	1,560,000	2,028,000	2,636,400	3,427,320
Working tools	7,500,000	19,500,000	25,350,000	32,955,000	42,841,500
Grand Total	188,668,240	507,876,000	635,893,000	914,304,800	1,141,892,740
Staff actually working at MBP	3	3	3	4	4
Cost / LOE ⁶⁸ charged to MBP	0.5	1	1	1	1
Actual LOE	1.5	3	3	4	4

The expense projections included a number of assumptions:

- A margin of 15% was added to the expenses in the financial projections. This was deemed appropriate since the MBP will be separated and there are bound to be some additional expenses which have not been imagined yet.
- Staff would be working only part time with the microinsurance fund in the early years; the rest of their time is therefore allocated to the MFI.
- An inflation rate of 8% per year was used for the projections. While in early 2008 the Government of Vietnam (GoV) had set a target maximum of 6% inflation in its 5-year plan (2006-2010), in reality it has been around 7-8% in the past few years and 12.6% in early 2008. In September 2008 inflation was 28% year-on-year, at year end it is expected to be in the range of 25-30%.
- Investment expenses and loan collection expenses are not included.

Insured member projections

According to the MFI's new business plan, MBP membership was projected to number 30,510 members as of the launch date of July 2008. Growth in active membership was projected using the following assumptions included in the business plan:

Table A1.11: Projected operating expenses

	2008*	2009	2010	2011	2012
Projected active membership at the end of the year	34,970	44,638	51,200	59,200	67,200
Projected average membership in year	32,740	39,804	47,919	55,200	63,200

* Note only the second half of 2008 is included in the average projected members, as the launch was planned for July 2008.

⁶⁸ LOE: Level Of Effort

Willingness to pay

Average monthly income of the target market was estimated to be less than VND 100,000.

The total premium for the product, after the pilot, was set at 1000 per week, plus a 1000 contribution to capital for the first 100 weeks.

In the initial market research conducted prior to the product redesign, willingness to pay for the covered risks was estimated as follows:

Table A1.12 Willingness to pay

Covered risk/benefit	VND per week	US\$ per week
Pension	3500	0.17
Life	600	.03
Health	600	.03

Reinsurance

The consultant did not identify a need for reinsurance for this programme other than catastrophe reinsurance, however no reinsurance arrangements was put in place.

2011 Pricing review

An experience review was undertaken in August 2011 which covered a study period from 1 August 2008 to 31 March 2011. Data on loans, membership and claims up to 30 September 2011, as well as other financial data, was provided to the consultant by the microinsurance business unit.

- Membership data had been accumulated in various MFI banking systems from as early as 1992 up to April 1, 2011.
- Claims data was captured in Excel at the MFI branches and in MBP home office.
- Incurred claims data was compared to the paid claims reflected in the financial statements for the same study period. The observed differences were within tolerable limits.

The data, while useful, was found to be of limited value for a number of reasons:

- History of changes with respect to members' status and household composition was not captured by the MFI. Only a snapshot of the membership data as of the time of enrolment was available.
- Claims records could not be linked to the membership data since the two datasets had a different primary key.
- Claims data was found to have numerous coding errors and hence the incidence rates could not be readily determined.
- Members that drop out are automatically deleted by the MFI software. However some salvaging through various backup datasets enabled data recovery of all deleted members, according to the database administrator.
- Loans which had matured had been deleted which made it impossible to calculate credit life exposure.
- There are other gaps in the data, such as missing birth dates.

Table A1.13: 2011 membership data history

Year	Year End active members	MBP ENTRY			RISK EXPOSURES		
		# of new members	# of new spouses	# of new children	member	spouses	children
2008 (Aug-Dec)	34,494	35,563	31,286	82,011	12,599	11,078	29,149

Year	Year End active members	MBP ENTRY			RISK EXPOSURES		
		# of new members	# of new spouses	# of new children	member	spouses	children
2009	40,710	11,577	10,404	24,402	37,964	33,454	87,096
2010	55,257	19,848	18,098	39,558	48,772	43,404	108,086
2011 (Jan-Mar)	57,502	4,187	3,824	8,239	13,818	12,365	30,039
Totals		71,175	63,612	154,210	113,154	100,301	254,370

Table A1.13: 2011 membership data by age bands

Age Band	Age profile of members when they enrolled in MBP		Age profile of ACTIVE members @31Mar2011		Members with spouses when they enrolled in MBP		# of children per member (at MBP entry)
	# of members	%	# of members	%	# of members	% within age band	
under 20	574	0.81%	173	0.30%	490	85.37%	1.79
20-24	4,745	6.67%	2,660	4.63%	4487	94.56%	1.64
25-29	9,402	13.21%	6,600	11.48%	9001	95.73%	1.87
30-34	10,472	14.71%	7,835	13.63%	9974	95.24%	2.18
35-39	10,409	14.62%	8,609	14.97%	9660	92.80%	2.34
40-44	9,700	13.63%	7,664	13.33%	8727	89.97%	2.35
45-49	10,794	15.17%	8,479	14.75%	9343	86.56%	2.32
50-54	8,549	12.01%	8,321	14.47%	7011	82.01%	2.24
55-59	4,784	6.72%	4,603	8.00%	3691	77.15%	2.12
60-64	1,318	1.85%	1,991	3.46%	960	72.84%	2.04
65-69	328	0.46%	410	0.71%	214	65.24%	1.96
70-74	75	0.11%	120	0.21%	40	53.33%	1.97
75+	25	0.04%	37	0.06%	14	56.00%	2.04
Totals	71,175	100.00%	57,502	100.00%	63,612	89.37%	2.17

Table a1.14: Incurred claims

Year	Total claims records	# of claims records used	Member deaths	Member hospitalizations	Spouse deaths	Child deaths
2008 (Aug - Dec)	490	469	??	362	??	??
2009	1734	1734	??	1329	??	??
2010	2433	2433	??	1960	??	??
2011 (Jan-Mar)	651	532	??	408	??	??
Totals	5308	5168	271	4059	580	114
Revised Totals*	5308	5168	200	4059	639	126

* A total of 271 member deaths were indicated in the data, however with some difficulty it was finally determined that 71 of these member deaths were actually children deaths or spouse deaths. Since the exact split could not be determined, it was assumed that these coding errors were random and the reallocation of these 71 miscoded member deaths was made as follows:

- Adjusted spouse deaths = 580 (from data) + 71*580/(580+114) = 580 + 59 = 639
- Children deaths = 114 (from data) + 71 - 59 = 126

Since the death indicators were not reliable, death benefit amounts by study year could not be determined.

Figure a1.17: Incurred claims ratio

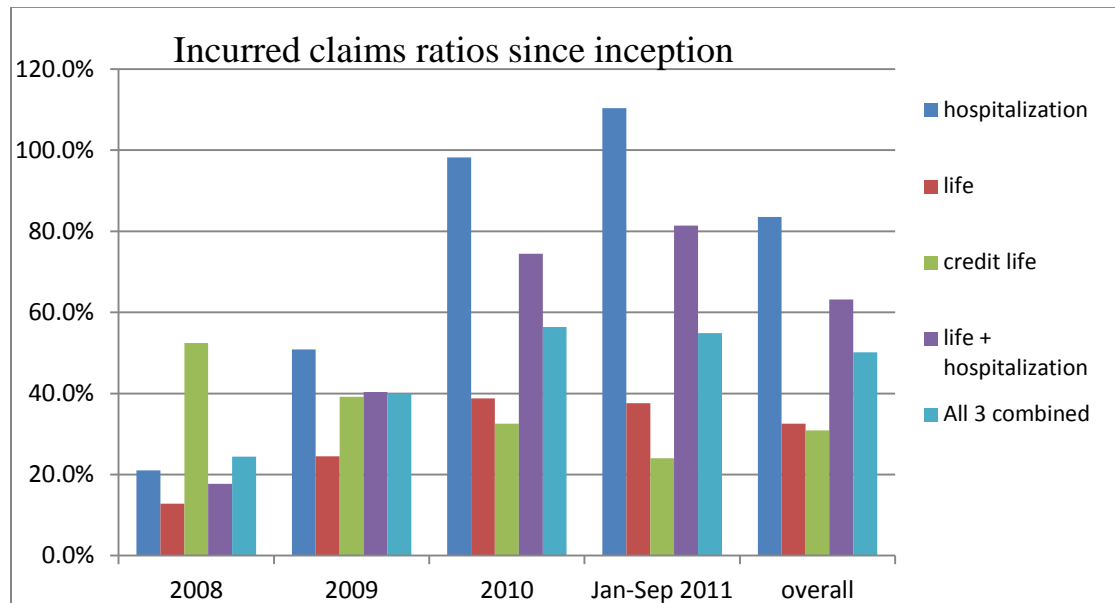


Table A1.15: Actual to expected (A/E) mortality experience rates

Parameter	Incidence rates used in pricing	Actual incidence (per member exposure)	A/E for the study period
Member mortality	0.14%	0.177%	122.7%
Member hospitalization	2.00%	3.590%	179.7%
Spouse mortality	0.58%	0.565%	96.7%
Child mortality	0.26%	0.111%	42.2%

Analysis of results

Member mortality rates were 22.7% higher than expected. The jump in member mortality may be due to one or more of the following reasons:

- While data problems are known to exist in the current dataset, it is also possible that some claims were missing or incorrectly coded in the 2002-2007 claims dataset which led to underestimation of mortality rates used for pricing.
- There may be some adverse selection going on. This would be possible if, for example, the field officers were more aggressively recruiting new members in order to meet the growth objectives of the MFI business plan and as such, would use the MBP as a marketing tool to which members in less-than-perfect health are easily attracted.
- There may have been some changes in membership requirements (e.g. recruiting older members on average, or not requiring new members to be in a good state of health).

The hospitalization incidence was nearly double from the 2% initially expected. Prior to the new MBP members could only claim once in a lifetime but when they rolled over to the new MBP they could avail of this benefit anew, although it is still limited to one claim every 5 years. Hence, previous experience data was not useful in estimating the incidence.

According to MBP management, a significant number of members abuse the health programme by admitting themselves in the hospital, even if they just have the flu. The branch is supposed to approve each admission but one possibility is that some branch managers may be cooperating with their clients because they don't want to lose them. Another possibility is that members provide false documentation about their ailment so that the branch will approve hospitalization.

The MBP financial statements were also analyzed and the trend in both life and hospitalization incurred claims ratios (incurred claims divided by earned premium) is clearly upward. Both of these ratios are increasing in spite of stable incidence rates because of the higher benefits for second, third, and higher duration memberships.

Credit life remains profitable and in fact has a declining incurred claims ratio. This may also support the hypothesis that there is adverse selection:

- Quite a few members in less than perfect health join the MFI and take out minimum size loans, just to access the insurance protection.
- After claiming the hospitalization benefit they drop out (and possibly re-join later). Some of those members are sick enough to die.

It is clear that the mortality incidence from credit life is different from the overall membership mortality; one would expect these to be similar, at least in terms of trends.

Recommendations made by the Consultant

No change in rates is necessary, unless changes to benefits or policies are made. However, higher incidence rates than expected for member death and hospitalization benefits do show that processes can be reinforced:

- Consider revising the benefits for first year members, in order to curb adverse selection.
- No hospitalization benefit until at least 1 year of membership is completed
- Stricter measures required for approval of hospitalization by field office – *ideally* there should be a clinic at each branch, manned by a nurse, but this requires a big investment, and members would be required to go to the clinic before hospitalization to be screened and treated. Only serious cases would be referred.
- Members that enter MBP, avail of the hospitalization benefit and then drop out should not be able re-enter for some time and when they do re-enter, the once-in-5 year health claim allowed should not be reset to zero, but rather should be set to the status when the member dropped out.

Appendix 2 – Data checklist

Context and Target Population: Data Checklist

This list summarizes the main topics one may find relevant to document in order to better understand the country/region context in which the microinsurance programme will operate as well as the target population characteristics. All information may not be relevant for every programme, as requirements will depend on the level of knowledge of the target population, the risks to be covered and the distribution and claim processes to be implemented. Neither is this list exhaustive. One may also want to collect information by relevant segments of in the target market.

Date of the assessment: _____ **Done by:** _____

Macroeconomic information

	Year N	Year N-1	Year N-2	Year N-3	Year N-4
GPD / capita					
GDP growth rate					
Inflation rate					
% of population below poverty line ⁶⁹					
Human Development Index ⁷⁰					

What is the political system of the country?

What are the main exports and imports of the country?

What are the recent trends in the economy?

Financial services and insurance

Insurance regulation:

- Which entity regulates insurance activities?
- Is there specific microinsurance regulation? If not, is there a draft microinsurance regulation?
- What are the main obstacles for microinsurance development?⁷¹

Insurance landscape

- What are the main insurance companies in the region/country (Life, Non-life)?
- What is the insurance penetration?
- Are there already microinsurance products available? What do you know about coverage, price, registration and claim processes? It is recommended that one try to find out as much as possible on this, and leaving some documentation for the project archives is advisable.
- Social Security coverage available to the target market (health insurance coverage, old age pension etc ...)
- Other informal risk mitigation mechanisms

Financial landscape (if relevant)

- What are the main banks in the region/country?
- Which banks have a special focus on low income market?

⁶⁹ Define how the poverty line is calculated in the country

⁷⁰ The Human Development Index (HDI) is a comparative measure of life expectancy, literacy, education, and standards of living for countries worldwide.

⁷¹ Analysis of MI challenges can be found in Access to Insurance Initiative country publications (www.a2ii.org)

- What is banking penetration?
- What are the main Microfinance institutions present in the regions and membership
- Is e-banking available? What is the penetration of e-banking? You should look for e-banking regulation.

Target population information

	Actual	Trend?	Source	Priority level (1-High, 2-Medium, 3-Low)
Target population demographics				
Target population description				
Size of potential target market				
Age distribution				
Gender distribution				
Family composition				
Density for targeted areas				
% formal employment				
% urban /rural				
Educational level				
Type of housing				
Access to water and sanitation				
Other living conditions data				
Main health diseases				
Life expectancy				
Maternal mortality rate				
Infant mortality rate				
Migration and potential impact				
Religion and beliefs, influencing insurance product				
Principal sources of income of the target market				
Main economic activities (precise average income and seasonality)				

	Actual	Trend?	Source	Priority level (1-High, 2-Medium, 3-Low)
1-				
2-				
Target market income distribution				
Cost of living				
Housing costs (rent) per month				
Transportation				
School fees / month				
Food spending / month				
Cell phone expenses / month				
Risk related information				
Seasonality of risk				
Willingness to pay for insurance				
Capacity to pay for insurance				
Risk coping mechanisms				
Exposure to extreme weather risk events?				
Access to government and NGO services				
Health				
Agriculture				
Education				
Other				

Infrastructure

Health

- What are the main health care providers in the region?
- Quality of health care providers?
- Utilization of health care providers?

- Maximum distance from village to the closest health centre / hospital?

Telecommunication

- Main cell phone companies?
- Cell phone penetration?
- Access to internet?
- Access to financial services via cell phones?

Transportation


- Access to paved roadways?
- Quality of roads?
- Maximum distance between villages and nearest ATM?

Appendix 3 – Data sources

SECONDARY DATA SOURCES

This list should help the pricing specialist to look for secondary sources of information while they are looking for data on the context and target population. The project team may decide to conduct primary data collection to fill relevant data gaps. Information collected should always be validated through a reasonability check process. While reviewing information, the following checklist should be completed for documentation purposes.

Date of the assessment: _____ Done by: _____



Data sources ⁷²	Description	Information collected ⁷³	Stored in ⁷⁴ ...	Links to other relevant sources ⁷⁵
<p>CIA World Factbook</p> <p>https://www.cia.gov/library/publications/the-world-factbook/</p>	<p><i>The World Factbook</i> provides information on the history, people, government, economy, geography, communications, transportation, military, and transnational issues for 267 world entities.</p> 			


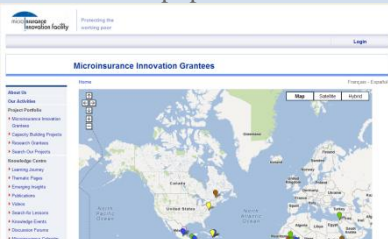
⁷² All sources used for pricing should be archived for documentation and will be useful documents for pricing review.

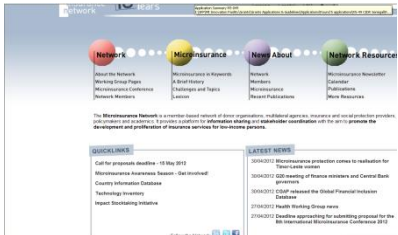

⁷³ Note the relevant indicators/information found during your review of the documents.


⁷⁴ Indicate where the report can be found for future review.

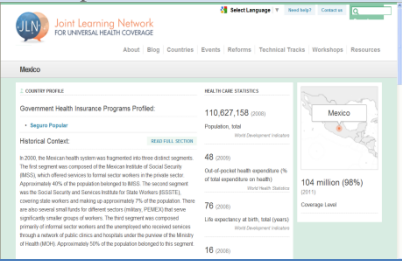

⁷⁵ Note the links to additional sources you have found and add a line to the checklist to document the information found.



Data sources ⁷²	Description	Information collected ⁷³	Stored in ⁷⁴ ...	Links to other relevant sources ⁷⁵
<p>Human Development Report (UNCDF)</p> <p>http://hdr.undp.org/en/</p>	<p>The Human Development Report is published every year, based on public international sources, and features the Human Development Index. The website provides data and statistic at country level for the main development indicators.</p> 			
<p>Gapminder</p> <p>http://www.gapminder.org/data/</p>	<p>Gapminder compiles a comprehensive list of indicators, produced by other reliable sources. Indicators are available per year and per country and the website allows for user-friendly graphical comparison.</p> 			

Data sources ⁷²	Description	Information collected ⁷³	Stored in ⁷⁴ ...	Links to other relevant sources ⁷⁵
<p>Access to Insurance Initiative http://www.access-to-insurance.org/country-experience.html</p>	<p>The A2II produces microinsurance country diagnostics, which aim to investigate and understand the insurance market and regulatory, policy and supervisory practices as far as they influence access to insurance markets for the underserved parts of the community and to provide practical, pragmatic and prioritized policy recommendations. The website also references relevant microinsurance regulation documentation.</p> 			
<p>Microinsurance Innovation Facility www.microinsurancefacility.org</p>	<p>The Microinsurance Innovation Facility documents the experience of microinsurance programmes which have been awarded an innovation grant using a “learning Journey report”. Microinsurance papers and research papers are also available.</p> 			

Data sources ⁷²	Description	Information collected ⁷³	Stored in ⁷⁴ ...	Links to other relevant sources ⁷⁵
<p>Microinsurance Network www.microinsurancenetwork.com</p>	<p>The Microinsurance Network is a platform for experience exchanges and gathers information of the sector. Working groups on different key topic have been created (health, agriculture, impact, consumer education ...) and are producing relevant documentation.</p> 			
<p>Center for Health Market Innovation http://healthmarketinnovations.org/</p>	<p>The website lists more than 1000 Health innovations programmes in 105 countries, including health microinsurance schemes.</p> 			

Data sources ⁷²	Description	Information collected ⁷³	Stored in ⁷⁴ ...	Links to other relevant sources ⁷⁵
World Health Organization (WHO) www.who.org	<p>The WHO data repository provides access to over 50 datasets on priority health topics including mortality and burden of diseases, the Millennium Development Goals (child nutrition, child health, maternal and reproductive health, immunization, HIV/AIDS, tuberculosis, malaria, neglected diseases, water and sanitation), non-communicable diseases and risk factors, epidemic-prone diseases, health systems, environmental health, violence and injuries, equity among others.</p> 			
World Bank http://www.worldbank.org	<p>World Bank produces a wide range of publications and data related to economics, development, agriculture, health, finance. Search is available at country level.</p>			
Insurance association of the country	<p>Should provide information on insurance market trends.</p>			
Ministry in charge of insurance regulation				
Local insurance regulators	<p>Should provide annual statistics of the insurance market.</p>			
Insurance companies' annual reports				
Ministry of Finance				
Central Bank publications				

Data sources ⁷²	Description	Information collected ⁷³	Stored in ⁷⁴ ...	Links to other relevant sources ⁷⁵
Financial institutions' annual reports				
Government statistical reports	<ul style="list-style-type: none"> • General household surveys • Latest national census and other demographics • Health surveys • Labour force surveys • Income and expenditure surveys 			
Swiss Re Sigma reports http://www.swissre.com/sigma	Annual publication from Swiss Re on the world insurance market, as well as additional interim reports			
Joint Learning Network http://www.jointlearningnetwork.org/	<p>The website documents case studies of relevant social protection initiative for 10 countries.</p> 			
Mix Market http://www.mixmarket.org/	<p>MIX Market provides instant access to financial and social performance information covering approximately 2,000 MFIs around the world.</p> 			

Data sources ⁷²	Description	Information collected ⁷³	Stored in ⁷⁴ ...	Links to other relevant sources ⁷⁵
<p>Finindex http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTRESEARCH/EXTPROGRAMMES/EXTFINRES/EXTGLOBALFIN/0,,contentMDK:23147627~pagePK:64168176~piPK:64168140~theSitePK:8519639,00.html</p>	<p>Global Finindex is the first public database of indicators that consistently measure people's use of financial products across economies and over time. The database can be used to track financial inclusion policies globally and develop a deeper and more nuanced understanding of how people around the world save, borrow, make payments, and manage risk.</p> 			
<p>IFAD www.ifad.org www.ruralpoverty.org</p>	<p>IFAD is dedicated to eradicating rural poverty in developing countries. From rural finance to livestock, range of topics related of interest when developing products for rural population. Includes case studies, data and publications. The rural Poverty Portal provides country-specific information on rural poverty.</p> 			
<p>NGOs and academic publications</p>				

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